Driveline Angles @ Curb Specifications

Engine (L)	Engine Angle (Deg)	Driveshaft Angle (Deg)	Pinion Angle (Deg)
3.8	4.0	2.95	0.55
4.6 (2V)	4.0	3.61	0.55

All driveshaft and pinion angles point downward.

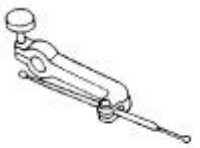
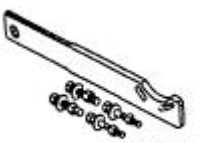
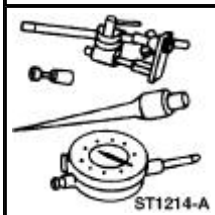
General Specifications

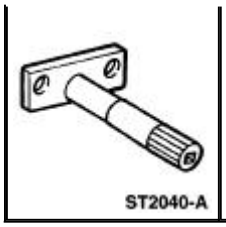
Item	Specification
Axle Capacities and Lubricant Specifications	
7.5 inch rear axle [a]	1.5 liters (3.5 pints)
8.8 inch rear axle [a] (base and GT vehicles)	1.9 liters (4.0/3.75 pints)
Traction-Lok [b]	118 ml (4 oz)
Premium Rear Axle Lubricant XY-80 W90-QL	WSP-M2C197-A
Additive Friction Modifier C8AZ-19B546-A	EST-M2C118-A
Premium Long-Life Grease XG-1-C	ESA-M1C75-B

[a] Service refill capacities are determined by filling the axle 6.3 mm (0.25 in [1/4 in]) to 14.3 mm (0.57 in [5/16 in]) below the bottom of the filler hole. The vehicle must be on a level surface.
[b] Friction Modifier

Driveline System

Special Tool(s)

ST1268-A	Clamp Plate 205-320 (T92L-4851-C)
 ST1348-A	Clutch Housing Alignment Adapter 308-021 (T75L-4201-A)
 ST1257-A	Companion Flange Holding Tool 205-126 (T78P-4851-A)
ST1267-A	Companion Flange Runout Gauge 205-319 (T92L-4851-B)
 ST1214-A	Dial Indicator with Bracketry 100-002 (TOOL-4201-C) or equivalent
ST1266-A	Dial Indicator/Magnetic Base 100-D002 (D78P-4201-B) or equivalent
ST2207-A	Vibration Analyzer 100-F027 (014-00344)
	Traction-Lok® Torque Tool 205-022 (T66L-4204-A)



Inspection and Verification

Certain axle noise or vibration symptoms are also common to the engine, transmission, wheel bearings, tires, and other parts of the vehicle. For this reason, be sure that the cause of the trouble is in the axle before disassembling, adjusting or repairing the axle. Refer to Section 100-04 .

Certain driveshaft vibration symptoms are common to the front engine accessory drive (FEAD), the engine, transmission or tires. Be sure the cause of the concern is the driveshaft before repairing or installing a new driveshaft. Refer to Section 100-04 .

Certain symptoms may be caused by Traction-Lok® differentials (4026). Check the vehicle certification label and axle identification tag to determine the type of differential. Refer to Section 100-01 .

Noise Acceptability

NOTE: A gear-driven unit will produce a certain amount of noise. Some noise is acceptable and audible at certain speeds or under various driving conditions such as a newly paved blacktop road. Slight noise is not detrimental to the operation of the axle and is considered normal.

With the Traction-Lok® differential axle, slight chatter noise on slow turns after extended highway driving is considered acceptable and has no detrimental effect on the locking axle function.

Universal Joint (U-Joint) Inspection

Place the vehicle on a frame hoist and rotate the driveshaft (4602) by hand. Check for rough operation or seized U-joints. Install a new U-joint if it shows signs of seizure, excessive wear, or incorrect seating. Refer to Section 205-01 .

Analysis of Leakage

Clean up the leaking area enough to identify the exact source. An axle leak can be caused by the following.

- Axle lubricant level is too high.
- Worn or damaged axle shaft seals or differential seals.
- Differential housing is cracked.
- Flange yoke seat is worn or damaged.
- Pinion flange is scored or damaged.
- Axle cover is not sealed.
- Vent is plugged.

Repair the axle as necessary. Make sure the axle lubricant is at the correct level. Refer to Specifications in this section.

Axle Vent

NOTE: If a plugged vent cannot be cleared, install a new one.

A plugged vent will cause excessive seal lip wear due to internal pressure buildup. If a leak occurs, check the vent. Make sure the vent hose is not kinked. Remove the hose from the vent nipple and clear the hose of any foreign material. While the hose is removed, pass a length of mechanics wire in and out of the vent to clean it. Connect the hose when done.

Flange Yoke Seal

Leaks at the axle drive pinion seal originate for the following reasons:

- Seal was not correctly installed.
- Poor quality seal journal surface.

Any damage to the seal bore (dings, dents, gouges, or other imperfections) will distort the seal casing and allow leakage past the outer edge of the axle drive pinion seal.

The axle drive pinion seal can be torn, cut, or gouged if it is not installed carefully. The spring that holds the axle drive pinion seal against the pinion flange may be knocked out and allow leakage past the lip.

The rubber lips can occasionally become hard (like plastic) with cracks at the oil lip contact point. The contact point on the pinion flange may blacken, indicating excessive heat. Marks, nicks, gouges, or rough surface texture on the seal journal of the pinion flange will also cause leaks.

When a seal leak occurs, install a new seal and check the vent and the vent hose to make sure they are clean and free of foreign material.

Axle Shaft Seals

Axle shaft oil seals are susceptible to the same kinds of damage as axle drive pinion seals if incorrectly installed. The seal bore must be clean and the lip handled carefully to avoid cutting or tearing it. The axle shaft journal surface must be free of nicks, gouges, and rough surface texture.

Differential Seals

Refer to Section 205-02A or Section 205-02B .

Analysis of Vibration

WARNING: A vehicle equipped with a Traction-Lok® differential will always have both wheels driving. If only one wheel is raised off the floor and the rear axle is driven by the engine, the wheel on the floor could drive the vehicle off the stand or jack. Be sure both rear wheels are off the floor.

Few vibration conditions are caused by the rear axle. On a vibration concern, follow the diagnosis procedure in Section 100-04 unless there is a good reason to suspect the axle.

Tires

WARNING: Do not balance the wheels and tires while they are mounted on the vehicle. Possible tire disintegration/differential failure could result, causing personal injury/extensive component damage. Use an off-vehicle wheel and tire balancer only.

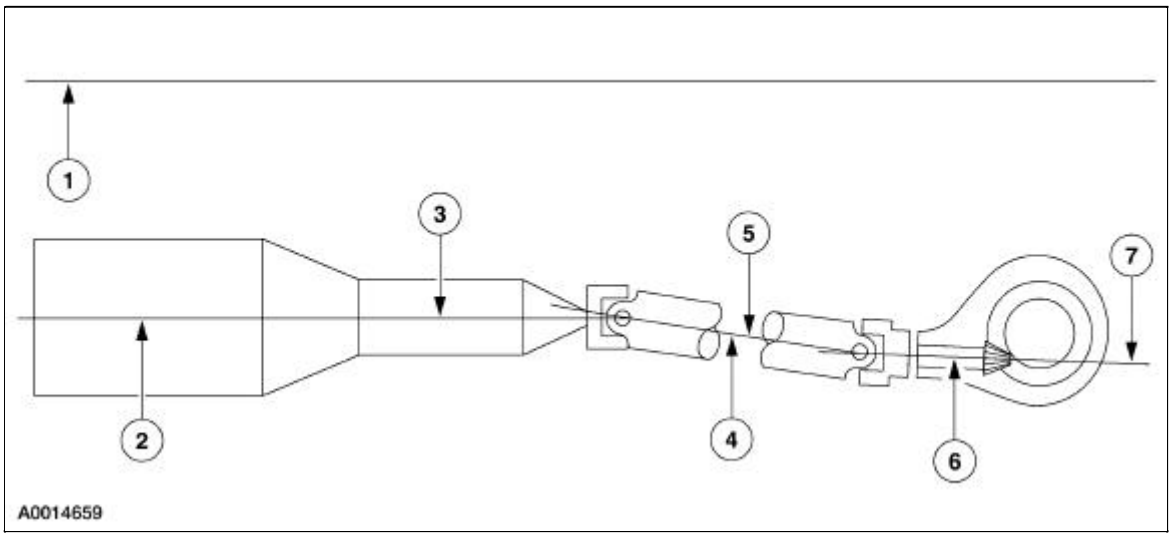
Most vibration in the rear end is caused by tires or driveline angle.

Vibration is a concern with modern, high-mileage tires if they are not "true" both radially and laterally. They are more susceptible to vibration around the limits of radial and lateral runout of the tire and wheel assembly. They also require more accurate balancing. Wheel and tire runout checks, truing and balancing are normally done before axle inspection. Refer to Section 204-04 .

Driveline Angle

Driveline angularity is the angular relationship between the engine crankshaft (6303), the driveshaft, and the rear axle pinion. Factors determining driveline angularity include ride height, rear spring, and engine mounts.

Driveline Angle



Item	Description
1	Bottom of the frame
2	Engine crankshaft centerline
3	Engine angle
4	Driveshaft and coupling shaft centerline
5	Driveshaft and coupling shaft angle
6	Rear axle pinion centerline
7	Axle pinion angle

An incorrect driveline (pinion) angle can often be detected by the driving condition in which the vibration occurs.

- A vibration during coastdown from 72 to 56 km/h (45 to 35 mph) is often caused by an excessive U-joint angle at the axle (pinion nose downward).
- A vibration during acceleration, from 56 to 72 km/h (35 to 45 mph) may indicate an excessive U-joint angle at the axle (pinion nose upward).

When these conditions exist, check the driveline angles as described in the General Procedures portion of this section.

If the tires and driveline angle are not the cause, carry out the NVH tests to determine whether the concern is caused by a condition in the axle. Refer to Section 100-04 .

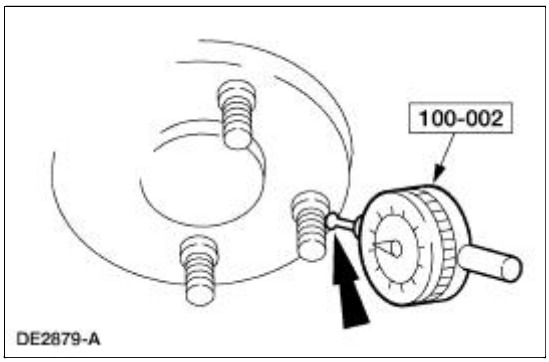
Universal Joint (U-Joint) Wear

Place the vehicle on a frame hoist and rotate the driveshaft by hand. Check for rough operation or seized U-joints. Install a new U-joint if it shows signs of seizure, excessive wear, or incorrect seating. Refer to Section 205-01 .

Wheel Hub or Axle Flange Bolt Circle Runout

NOTE: The brake discs must be removed to carry out all runout measurements.

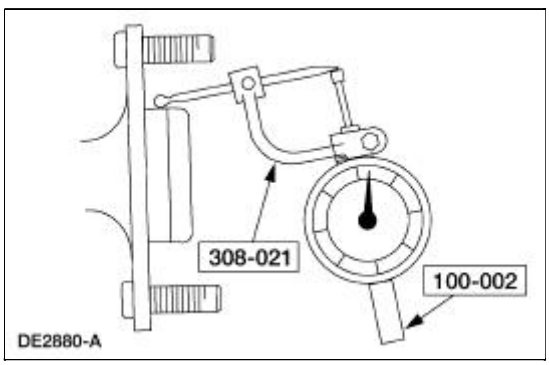
1. Position the special tool perpendicular to the wheel hub or axle flange bolt, as close to the hub or flange face as possible. Zero the indicator to allow the pointer to deflect either way.



2. Rotate the hub or flange until the next bolt is contacted. Record the measurement and continue until each bolt is checked. The difference between the maximum and minimum contact readings will be the total wheel hub or axle flange bolt pattern runout. The runout must not exceed 0.38 mm (0.015 inch).

Pilot Runout

1. Position the special tools as close to the hub or axle flange face as possible. Zero the indicator to allow the pointer to deflect either way.

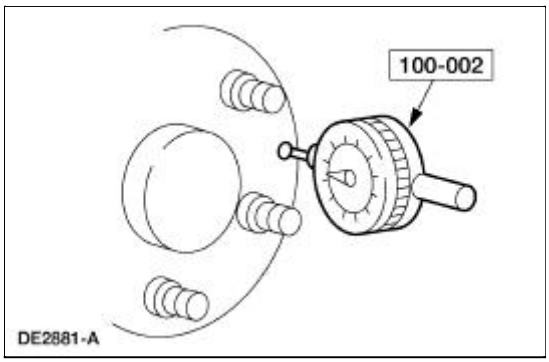


2. Rotate the hub or flange one full turn and note the maximum and minimum readings. The difference between the maximum and minimum readings will be the total pilot runout. Pilot runout must not exceed 0.15 mm (0.006 inch).

Wheel Hub or Axle Flange Face Runout

NOTE: If the axle shaft assembly is removed, check runout of the shaft itself. The forged (unmachined) part of the shaft is allowed to have as much as 3.0 mm (0.120 inch) runout. This alone will not cause a vibration condition.

1. Position the special tool on the wheel hub or axle flange face, as close to the outer edge as possible. Zero the indicator to allow the pointer to deflect either way.



2. Rotate the hub or flange one full turn and note the maximum and minimum readings. The difference between the maximum and minimum readings will be the total face runout. The runout must not exceed 0.127 mm (0.005 inch).

Drive Pinion Stem and Pinion Flange

Check the pinion flange runout when all other checks have failed to show the cause of vibration.

One cause of excessive pinion flange runout is incorrect installation of the axle drive pinion seal. Check to see if the spring on the seal lip has been dislodged before installing the ring gear and pinion.

Axle Noise

NOTE: Before disassembling the axle to diagnose and correct gear noise, eliminate the tires, exhaust, trim items, roof racks, axle shafts and wheel bearings as possible causes. Follow the diagnostic procedures in Section 100-04 .

The noises described as follows usually have specific causes that can be diagnosed by observation as the unit is disassembled. The initial clues are the type of noise heard during the road test.

Gear Howl and Whine

Howling or whining of the ring gear and pinion is due to an incorrect gear pattern, gear damage or incorrect bearing preload.

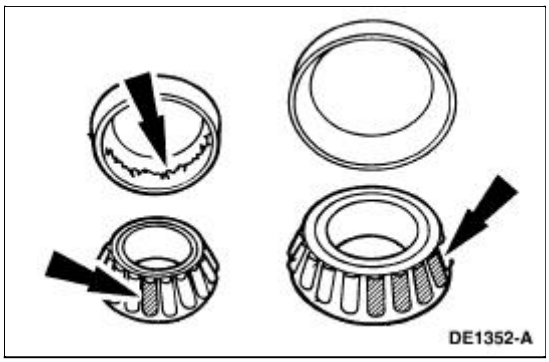
Bearing Whine

Bearing whine is a high-pitched sound similar to a whistle. It is usually caused by worn/damaged pinion bearings, which are operating at driveshaft speed. Bearing noise occurs at all driving speeds. This distinguishes it from gear whine which usually comes and goes as speed changes.

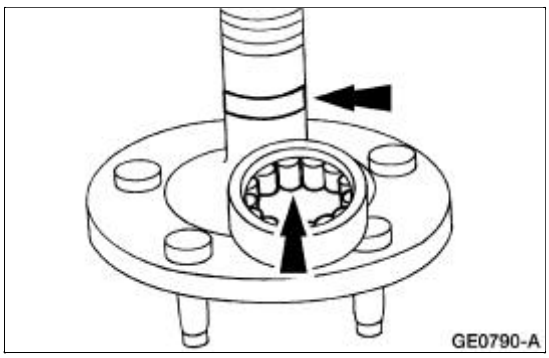
As noted, pinion bearings make a high-pitched, whistling noise, usually at all speeds. If however there is only one pinion bearing that is worn/damaged, the noise may vary in different driving phases. If pinion bearings are scored or damaged or there is a specific pinion bearing noise, new pinion bearings must be installed. A worn/damaged bearing will normally be obvious at disassembly. Examine the large end of the rollers for wear. If the pinion bearings original blend radius has worn to a sharp edge, a new pinion bearing must be installed.

NOTE: A low-pitched rumble normally associated with a worn/damaged wheel bearing can also be caused by tires.

A wheel bearing noise can be mistaken for a pinion bearing noise. Check the wheel bearing for a spalled cup, and spalled/damaged rollers. Check the wheel bearing for rotating smoothness and end play. Install a new wheel bearing if any of these concerns are detected.



If the wheel bearing is damaged, the roller surface on the axle shaft may also be damaged. Install a new axle shaft if any damage is detected.



Chuckle

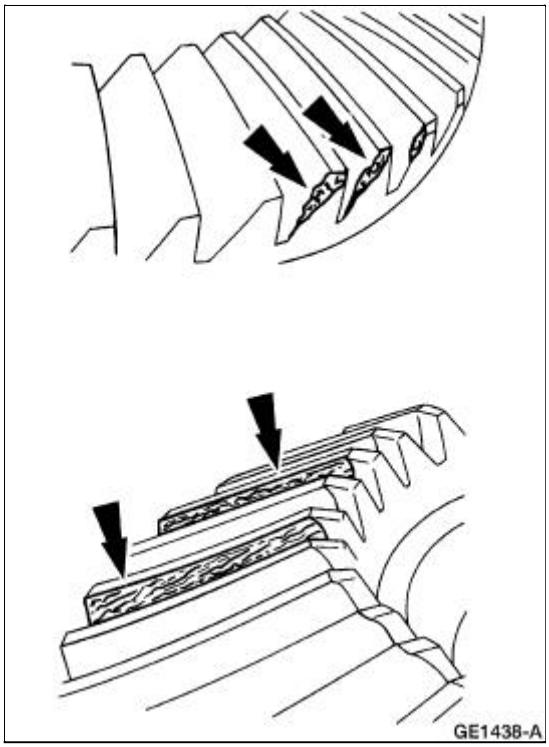
Chuckle that occurs on the coast driving phase is usually caused by excessive clearance between the differential gear hub and the differential case bore.

Damage to a gear tooth on the coast side can cause a noise identical to a chuckle. A very small tooth nick or ridge on the edge of a tooth can cause the noise.

Clean the gear tooth nick or ridge with a small grinding wheel. If the damaged area is larger than 3.2 mm (1/8 inch), install a new gearset.

To check the ring gear and pinion, remove as much lubricant as possible from the gears with clean solvent. Wipe the gears dry or blow them dry with compressed air. Look for scored or damaged teeth. Also look for cracks or other damage.

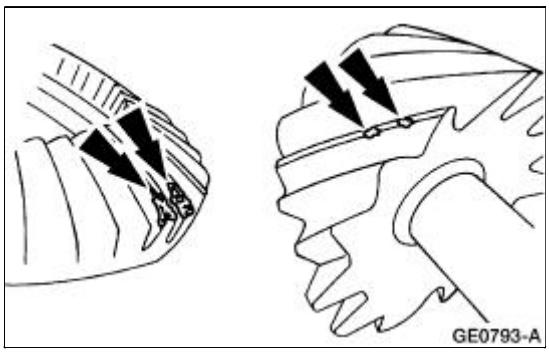
If either gear is scored or damaged badly, install a new ring gear and pinion.



If metal has broken loose, the axle housing must be cleaned to remove particles that will cause damage. At this time, any other new parts in the axle housing must also be installed, if necessary.

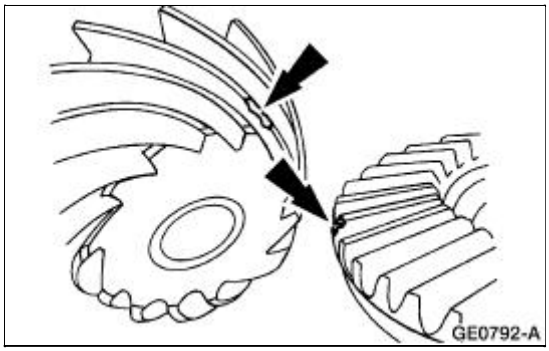
Knock

Knock, which can occur on all driving phases, has several causes including damaged teeth or gearset.



In most cases, one of the following conditions will occur:

1. A gear tooth damaged on the drive side is a common cause of the knock. This can usually be corrected by grinding the damaged area.



2. **NOTE:** Measure the end play with a Dial Indicator with Bracketry and not by feel.

   Knock is also caused by excessive end play in the axle shafts. Up to 0.762 mm (0.030 inch) is allowed in semi-float axles. The frequency of the knock will be less because the axle shaft speed is slower than the driveshaft.

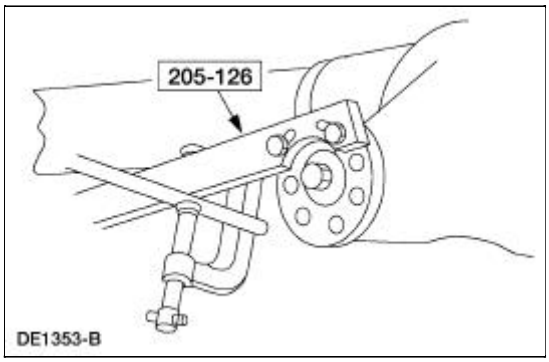
Clunk

Clunk is a metallic noise heard when the automatic transmission is engaged in REVERSE or DRIVE. The noise may also occur when throttle is applied or released. It is caused by backlash somewhere in the driveline or loose suspension components; it is felt or heard in the axle. Refer to Total Backlash Check in this section.

Additionally, clunk may be heard upon initial drive-away. This occurs as engine torque shifts vehicle weight, forcing changes in driveline angles, preventing the driveshaft slip-yoke from sliding on the output shaft. To correct for this condition, lubricate the slip-yoke splines.

Total Backlash Check

1. Raise and support the vehicle. Refer to Section 100-02 .
2. Remove the driveshaft. Refer to Section 205-01 .
3. Install the special tool.
   - Clamp a rigid bar or pipe to the tool. Clamp the other end of the bar or pipe to the frame or a body member in order to prevent movement of the rear axle pinion flange.



4. Lower the vehicle so that one rear wheel is resting on a wheel chock to prevent it from turning. The other rear wheel will be used to measure total rear axle backlash.
5. Rotate the free wheel slowly, by hand, until the feeling of driving the rear axle is encountered. Place a mark on the side of the tire, 305 mm (12 inches) from the center of the wheel, with a

crayon or chalk.

6. While holding the crayon or chalk against the tire, rotate the wheel slowly in the opposite direction until the feeling of driving the rear axle is encountered again.

7. Measure the length of the crayon or chalk mark on the tire.
    - If the length of the mark is 25.4 mm (1 inch) or less, the rear axle backlash is within allowable limits.
    - If the chalk mark is greater than 25.4 mm (1 inch), check for these conditions:
        - Elongation of the differential pinion shaft and holes in the differential case (4204).
        - Missing differential pinion thrust washer (4230) or differential side gear thrust washer (4228).
        - Galling of the differential pinion shaft (4211) and bore.
        - Excessive ring gear and pinion backlash. Follow the procedure for the type of rear axle to check backlash.

Axle Shaft Bearing Noise

Axle bearing shaft noise is similar to gear noise and differential pinion bearing whine. Axle shaft bearing noise will usually distinguish itself from gear noise by occurring in all driving modes (drive, coast, and float), and will persist with the transmission in NEUTRAL while the vehicle is moving at the speed in which the concern is occurring. If the vehicle makes this noise, remove the suspect axle shaft, install a new bearing and a new axle seal. Re-evaluate the vehicle for noise before removing any internal components.

Bearing Rumble

Bearing rumble sounds like marbles being tumbled. This condition is usually caused by a worn/damaged wheel bearing. The lower pitch is because the wheel bearing turns at only about one-third of the driveshaft speed. Wheel bearing noise also may be high-pitched, similar to gear noise, but will be evident in all four driving modes.

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• Traction-Lok® does not work in snow, mud or on ice	• Differential.	• CARRY OUT the Traction-Lok® Differential Operation Check in this section. REPAIR as necessary. REFER to Section 205-02A or Section 205-02B .
• Lubricant leaking from the pinion seal, axle shaft oil seals	• Vent. • Damage in the seal contact area or damaged or worn seal.	• CLEAN the axle housing vent. • INSTALL a new seal if damage is found.
• Differential side gears/pinion gears are scored	• Insufficient lubrication. • Incorrect or contaminated	• INSTALL new gears. REFER to Section 205-02A or Section 205-02B . FILL the axle to specification. • INSTALL new gears. REFER to Section 205-02A or Section

	lubricant type.	205-02B . CLEAN and REFILL the axle to specification.
• Axle overheating	• Lubricant level too low. • Incorrect or contaminated lubricant type. • Bearing preload adjusted too tight. • Excessive gear wear. • Incorrect ring gear backlash.	• CHECK the lubricant level. FILL the axle to specification. • INSPECT the axle for damage. REPAIR as necessary. CLEAN and REFILL the axle to specification. • CHECK the ring and pinion for damage. INSPECT the ring and pinion wear pattern. ADJUST the preload as necessary. • INSPECT all the axle gears for wear or damage. INSTALL new components as necessary. • INSPECT the ring gear for scoring. INSPECT the ring and pinion wear pattern. ADJUST the ring gear backlash as necessary.
• Broken gear teeth on the ring gear or pinion	• Overloading the vehicle.	• INSTALL a new ring and pinion. REFER to Section 205-02A or Section 205-02B .
• Axle shaft broken	• Overloading the vehicle. • Misaligned axle shaft tube.	• INSTALL a new axle shaft. REFER to Section 205-02A or Section 205-02B . • INSPECT the axle for damage. CHECK axle shaft tube alignment. INSTALL a new axle shaft. REFER to Section 205-02A or Section 205-02B .

Component Tests

Driveline Vibration

An analysis of driveline vibration can also be conducted using the Vibration Analyzer; follow the manufacturer's directions.

Driveline vibration exhibits a higher frequency and lower amplitude than does high-speed shake. Driveline vibration is directly related to the speed of the vehicle and is usually noticed at various speed ranges. Driveline vibration can be perceived as a tremor in the floorpan or is heard as a rumble, hum, or boom. Driveline vibration can exist in all drive modes, but may exhibit different symptoms depending upon whether the vehicle is accelerating, decelerating, floating, or coasting. Check the driveline angles if the vibration is particularly noticeable during acceleration or deceleration, especially at lower speeds. Driveline vibration can be duplicated by supporting the axle upon a hoist or upon jack stands, though the brakes may need to be applied lightly in order to simulate road resistance.

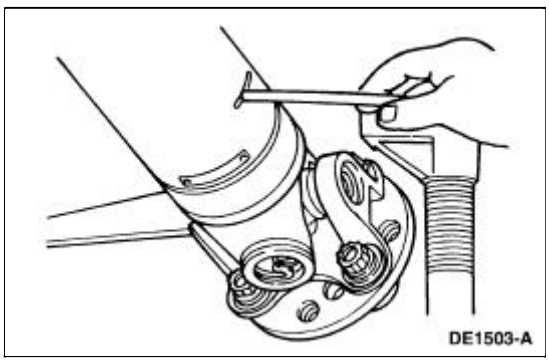
1. Raise the vehicle promptly after road testing. Use a twin-post hoist or jack stands to prevent tire flat-spotting. Engage the drivetrain and accelerate to the observed road test speed to verify the

presence of the vibration. If the vibration is not evident, check the non-driving wheels with a wheel balancer to rule out imbalance as a possible cause. If required, balance the non-driving wheels and repeat the road test. If the vibration is still evident, proceed to Step 2.

2. Mark the relative position of the drive wheels to the wheel nuts. Remove the wheels. Install all the nuts in the reversed position and repeat the road speed acceleration. If the vibration is gone, refer to the tire and wheel runout procedure in Section 204-04 . If the vibration persists, proceed to Step 3.

3. Inspect the driveshaft for signs of physical damage, missing balance weight, undercoating, incorrect seating, wear and binding universal joints. Clean the driveshaft and install new universal joints or a new driveshaft if damaged. Check the index marks (paint spots) on the rear of the driveshaft and pinion flange. If these marks are more than one-quarter turn apart, disconnect the driveshaft and re-index to align the marks as closely as possible. After any corrections are made, recheck for vibration at the road test speed. If the vibration is gone, reinstall the wheels and road test. If the vibration persists, proceed to Step 4.

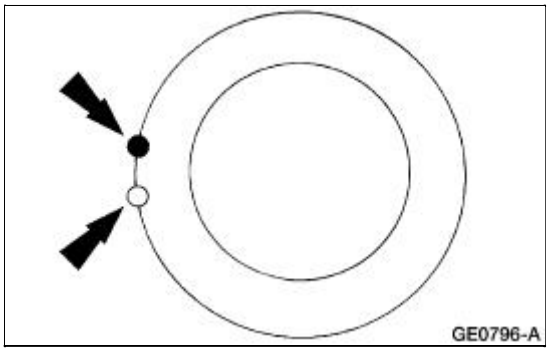
4. Raise the vehicle on a hoist and remove the wheels. Rotate the driveshaft by turning the axle and measure the runout at the front, the center, and the rear of the driveshaft with the indicator. If the runout exceeds 0.89 mm (0.035 inch) at the front or center, a new driveshaft must be installed. If the front and center are within this limit, but the rear runout is not, mark the rear runout high point and proceed to Step 5. If the runout is within the limits at all points, proceed to Step 7.



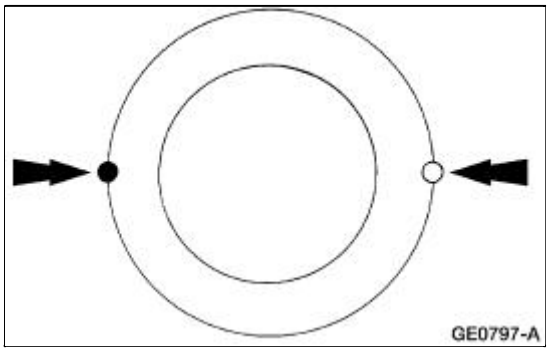
5. **NOTE:** Check the U-joints during re-indexing. If a U-joint feels stiff or gritty, install new U-joints.

   Scribe alignment marks on the driveshaft and the pinion flange. Disconnect the driveshaft, rotate it one-half turn, and reconnect it. Circular pinion flanges can be turned in one-quarter increments to fine tune the runout condition. Check the runout at the rear of the driveshaft. If it is still over 0.89 mm (0.035 inch), mark the high point and proceed to Step 6. If the runout is no longer excessive, check for vibration at the road test speed. If vibration is still present, re-index the driveshaft slip yoke on the transmission output shaft one-half turn and road test the vehicle. If the vibration persists, proceed to Step 7.

6. Excessive driveshaft runout may originate in the driveshaft itself or in the pinion flange. To determine which, compare the two high points marked in Steps 4 and 5. If the marks are close together, within about 25 mm (1 inch), a new shaft must be installed and the vehicle road tested.



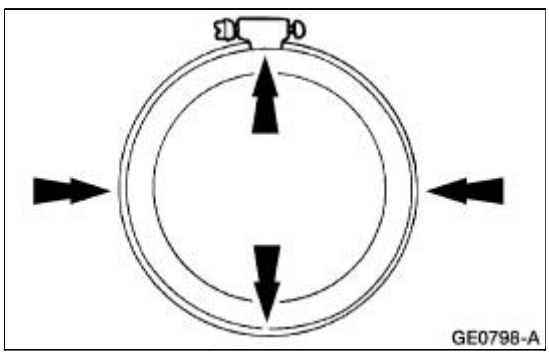
If the marks are on opposite sides of the driveshaft, the yoke or pinion flange is responsible for the vibration.



When installing a new pinion flange, the driveshaft runout must not exceed 0.89 mm (0.035 inch). When runout is within limits, recheck for vibration at road speed. If vibration persists, balance the driveshaft.

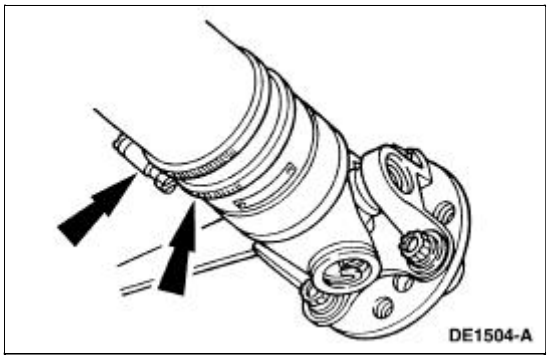
7. To balance the driveshaft, install one or two hose clamps on the driveshaft, near the rear. Position of the hose clamp head(s) can be determined by trial-and-error.

8. Mark the rear of the driveshaft into four approximately equal sectors and number the marks 1 through 4. Install a hose clamp on the driveshaft with its head at position No. 1.

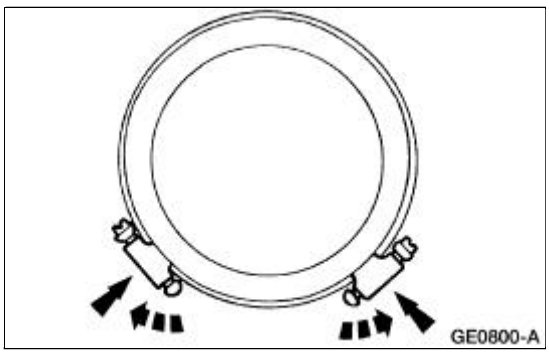


Check for vibration at road speed. Recheck with the clamp at each of the other positions to find the position that shows minimum vibration. If two adjacent positions show equal improvement, position the clamp head between them.

9. If the vibration persists, add a second clamp at the same position and recheck for vibration.



If no improvement is noted, rotate the clamps in opposite directions, equal distances from the best position determined in Step 8. Separate the clamp heads about 13 mm (1/2 inch) and recheck for vibration at the road speed.



Repeat the process with increasing separation until the best combination is found or the vibration is reduced to an acceptable level.

10. Install the wheels and road test (vibration noticeable on the hoist may not be evident during the road test). If the vibration is still not acceptable, install a new axle driveline vibration damper first, if so equipped. If the vibration is still not acceptable, refer to Section 205-02A or Section 205-02B for differential case and ring gear runout checks.

Driveshaft Vibrates

1. Road test the vehicle to determine the critical vibration points. Note the road speed, the engine RPM, and the shift lever positions at which the vibration occurs.

2. Stop the vehicle, place the transmission lever in neutral and run the engine through the critical speed ranges determined in Step 1.

3. If no vibration is felt, balance the driveshaft. Refer to Driveline Vibration in this section.

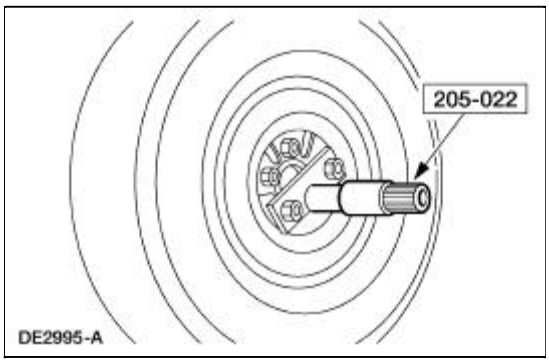
Traction-Lok® Differential Operation Check

A Traction-Lok® differential can be checked for correct operation without removing it from the rear axle housing.

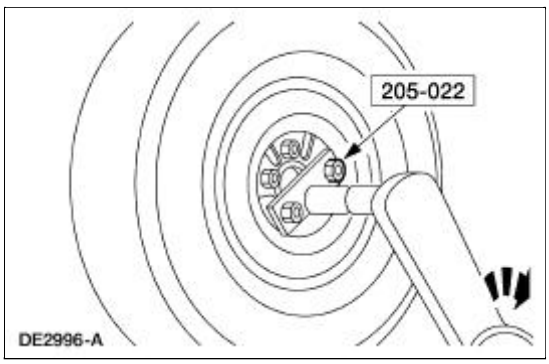
WARNING: A vehicle equipped with a Traction-Lok® differential will always have both wheels driving. If only one wheel is raised off the floor and the rear axle is driven by the engine, the wheel on the floor could drive the vehicle off the stand or jack. Be sure both rear wheels are

off the floor.

With the engine off, raise only one rear wheel. Install the special tool on the wheel nuts.



Use a torque wrench with a capacity of at least 271 Nm (200 lb-ft) to rotate the axle shaft. Be sure that the transmission is in NEUTRAL, and that one rear wheel is on the floor while the other rear wheel is raised off the floor. The breakaway torque required to start rotation must be at least 27 Nm (20 lb-ft). The initial breakaway torque may be higher than the continuous turning torque.



The axle shaft must turn with even pressure throughout the check without slipping or binding. If the torque reading is less than specified, check the differential case. Refer to Section 205-02A or Section 205-02B .

Traction-Lok® Differential Check Road Test

1. Place one wheel on a dry surface and the other wheel on ice, mud or snow.

2. Gradually open the throttle to obtain maximum traction prior to break away. The ability to move the vehicle demonstrates correct operation of a Traction-Lok® rear axle assembly.

3. When starting with one wheel on an excessively slippery surface, a slight application of the parking brake may be necessary to help energize the Traction-Lok® feature of the differential. Release the brake when traction is established. Use light throttle on starting to provide maximum traction.

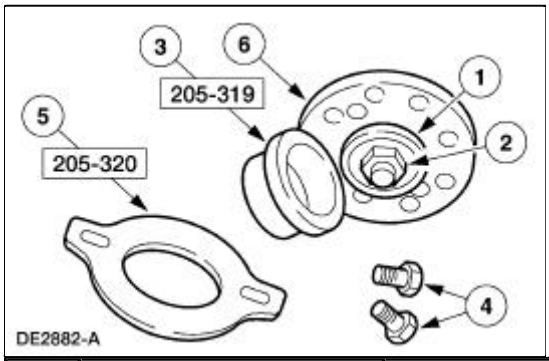
4. If, with unequal traction, both wheels slip, the limited slip rear axle has done all it can possibly do.

5. In extreme cases of differences in traction, the wheel with the least traction may spin after the Traction-Lok® has transferred as much torque as possible to the non-slipping wheel.

Companion Flange Runout Check

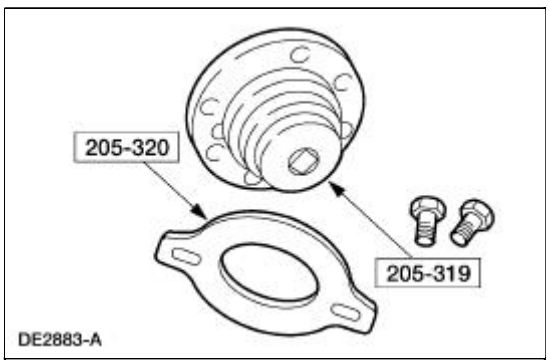
CAUTION: Pinion bearing preload must be reset if the pinion nut has been loosened or removed for pinion flange reindexing or installation.

1. Raise the vehicle on a twin-post hoist that supports the rear axle. Refer to Section 100-02 .
2. Remove the driveshaft. Refer to Section 205-01 .
3. Check the pinion flange for damage.
4. Position the Companion Flange Runout Gauge on the pinion flange.

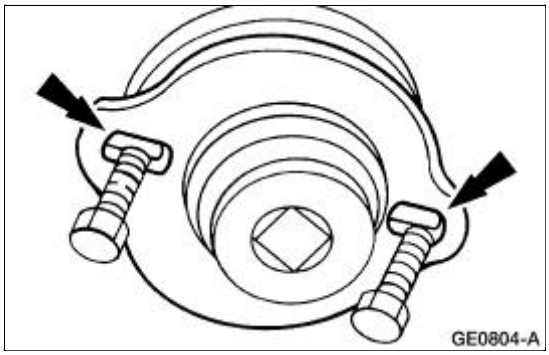


Item	Part Number	Description
1	—	Pilot (part of 205-319 [T92L-4851-B])
2	354845	Pinion nut
3	205-319 (T92L-4851-B)	Companion flange runout gauge
4	—	Bolts (2 Req'd) (Part of 205-320 [T92L-4851-C])
5	205-320	Clamp plate (T92L-4851-C)
6	4851	Pinion flange

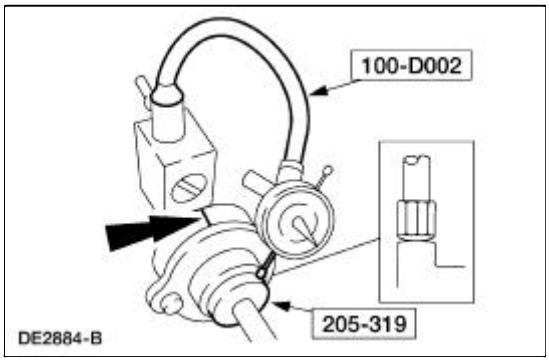
5. Position the special tools on the pinion flange.



6. Align the holes on the clamp plate with the holes in the pinion flange and install the bolts. Snug the bolts evenly.

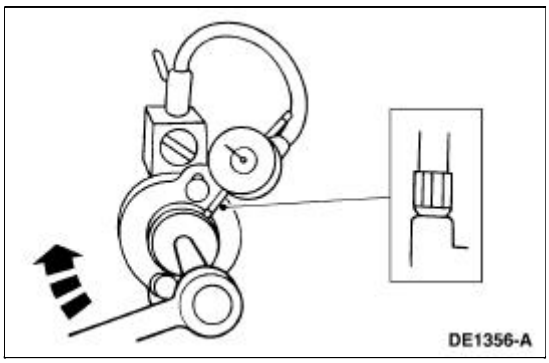


7. Position the special tool as shown. Turn the Companion Flange Runout Gauge, and locate and mark the high spot on the pinion flange with yellow paint.



If the flange runout exceeds 0.25 mm (0.010 inch), remove the pinion flange, reindex the flange one-half turn on the pinion, and reinstall it. Refer to Section 205-02A or Section 205-02B .

8. Check the runout again. If necessary, rotate the flange until an acceptable runout is obtained. If the flange runout is still more than 0.25 mm (0.010 inch), install a new pinion flange.



9. If excessive runout is still evident after installing a new pinion flange, install a new ring and pinion. Repeat the above checks until the runout is within specifications.

10. Install the driveshaft. Refer to Section 205-01 .

Tooth Contact Pattern Check — Gearset

1. To check the gear tooth contact, paint the gear teeth with the special marking compound. A mixture that is too wet will run and smear; a mixture that is too dry cannot be pressed out from between the teeth.

2. Use a box wrench on the ring gear bolts as a lever to rotate the ring gear several complete revolutions in both directions or until a clear tooth contact pattern is obtained.

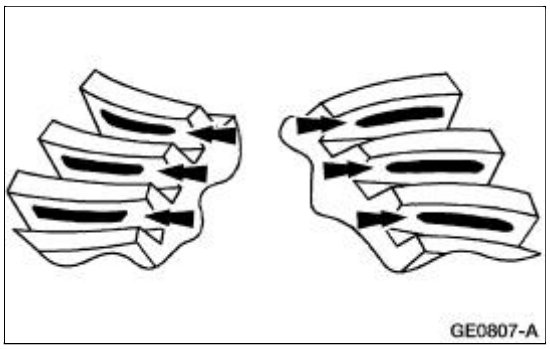
3. Certain types of gear tooth contact patterns on the ring gear indicate incorrect adjustment. Incorrect adjustment can be corrected by readjusting the ring gear or the pinion.

Contact Pattern Location

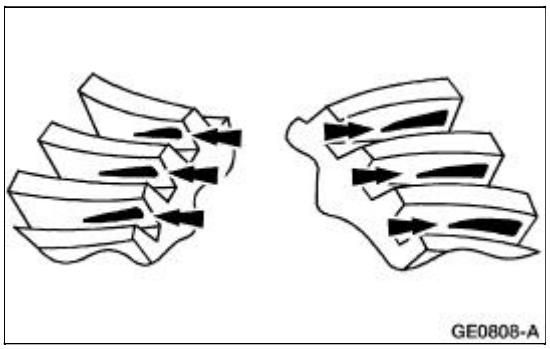
In general, desirable ring gear tooth patterns must have the following characteristics:

- drive pattern on the drive side ring gear well centered on the tooth
- coast pattern on the coast side ring gear well centered on the tooth
- clearance between the pattern and the top of the tooth
- no hard lines where the pressure is high

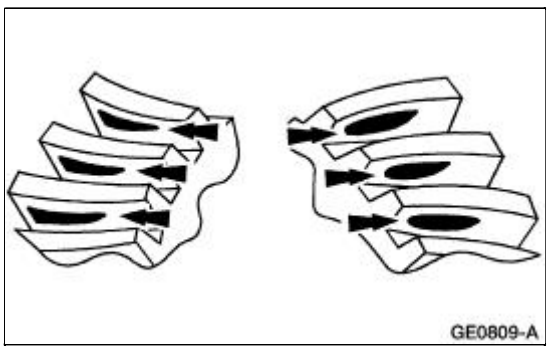
Acceptable ring gear tooth patterns for all axles.



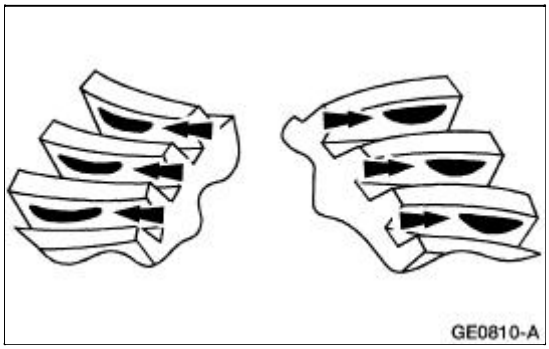
Correct backlash with a thinner pinion position shim required.



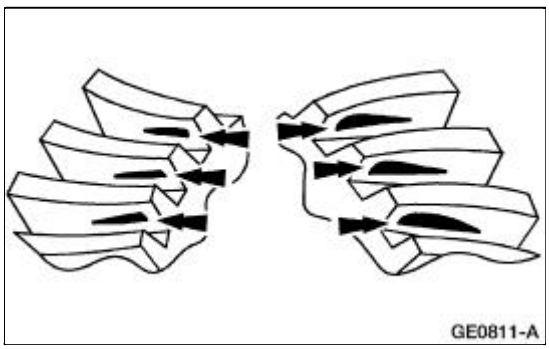
Correct backlash with a thicker pinion position shim required.



Correct pinion position shim that requires a decrease in backlash.



Correct pinion position shim that requires an increase in backlash.



Driveline Angle Inspection

Special Tool(s)

ST1622-A	Anglemaster II Driveline Inclinometer 164-R2402 or equivalent

NOTE: An incorrect driveline angle can cause a vibration or shudder. For additional information, refer to Section 100-04 .

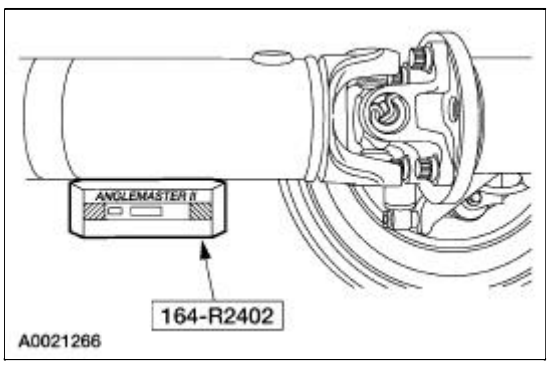
1. Check the vehicle for evidence or overload or sagging. Check for specified air pressures information in all four tires.

2. Normalize the suspension.

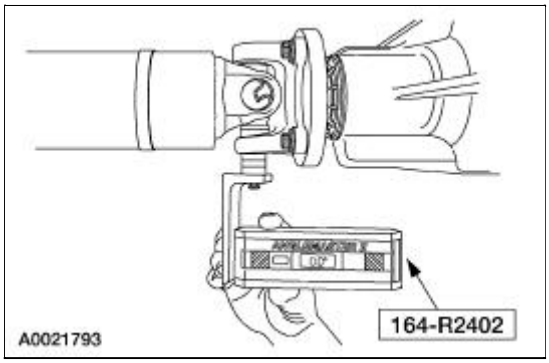
3. Drive the vehicle onto a drive-on hoist or back onto a front-end alignment rack.

4. Inspect the suspension and chassis. Verify that the vehicle curb position ride height is within specification. For additional information, refer to Section 204-00 .
   - Measure the curb position ride height with the vehicle empty and all fluids full.

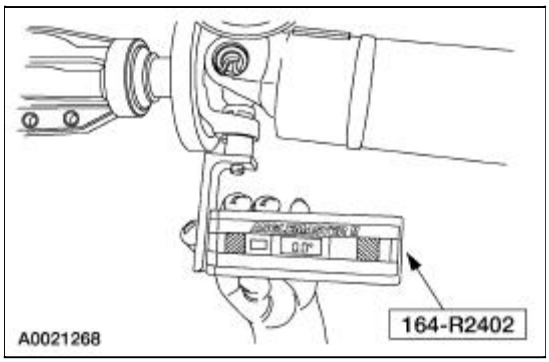
5. Place the Inclinometer flush against the bottom of the driveshaft. After the tool has been held on the driveshaft surface for 5 seconds, push the ALT ZERO button to calibrate to zero degrees. Remove the tool.



6. To check the pinion angle, rotate the driveshaft so that the rear axle pinion flange yoke ear is parallel to the floor. Remove the U-joint snap ring, then install the special tool. Check and record the pinion angle reading.
   - If the angle is not within specification, repair or adjust to obtain the correct angle. Inspect the rear suspension, rear axle, rear axle mounting or the frame for wear or damage.



7. To check the engine angle, rotate the driveshaft so that the slip yoke ear is parallel to the floor. Remove the U-joint snap ring, then install the special tool. Check and record the engine angle reading.
    - If the angle is not within specifications, repair or adjust to obtain the correct angles. Inspect the powertrain/drivetrain mounts or frame rails for wear or damage.

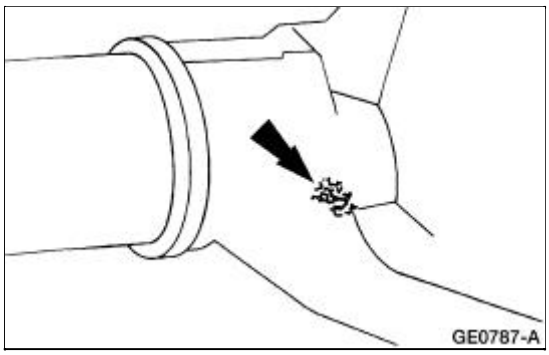


Axle Housing Casting Porosity (Holes in Casting) Repair

CAUTION: To keep the axle's sound characteristics, do not disassemble the carrier.

NOTE: Casting porosity is a condition where occasionally gas bubbles will form during the casting process leaving small pockets in the metal that will cause the axle housing to leak.

1. To fill small pockets, peen in a small amount of body lead.



2. Seal the pocket.
   - Use epoxy sealer meeting Ford specification M-3D35A(E).

3. To fill large pockets, drill and tap a shallow hole for a small setscrew. Install the setscrew and seal it.
   - Use epoxy sealer meeting Ford specification M-3D35A(E).

Axle Housing Weld Leaks Repair

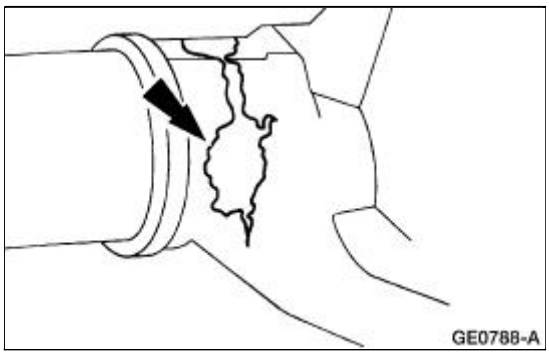
1. **CAUTION: To keep the axle's sound characteristics, do not disassemble the carrier.**

   CAUTION: Rear axle housing straightness is too critical for field repair. Install a new axle housing if a weld is broken.

   NOTE: Most minor weld leaks are repairable. This includes the puddle and fill welds that join the axle shaft tube to the axle housing on integral axles.

   Seal the weld.

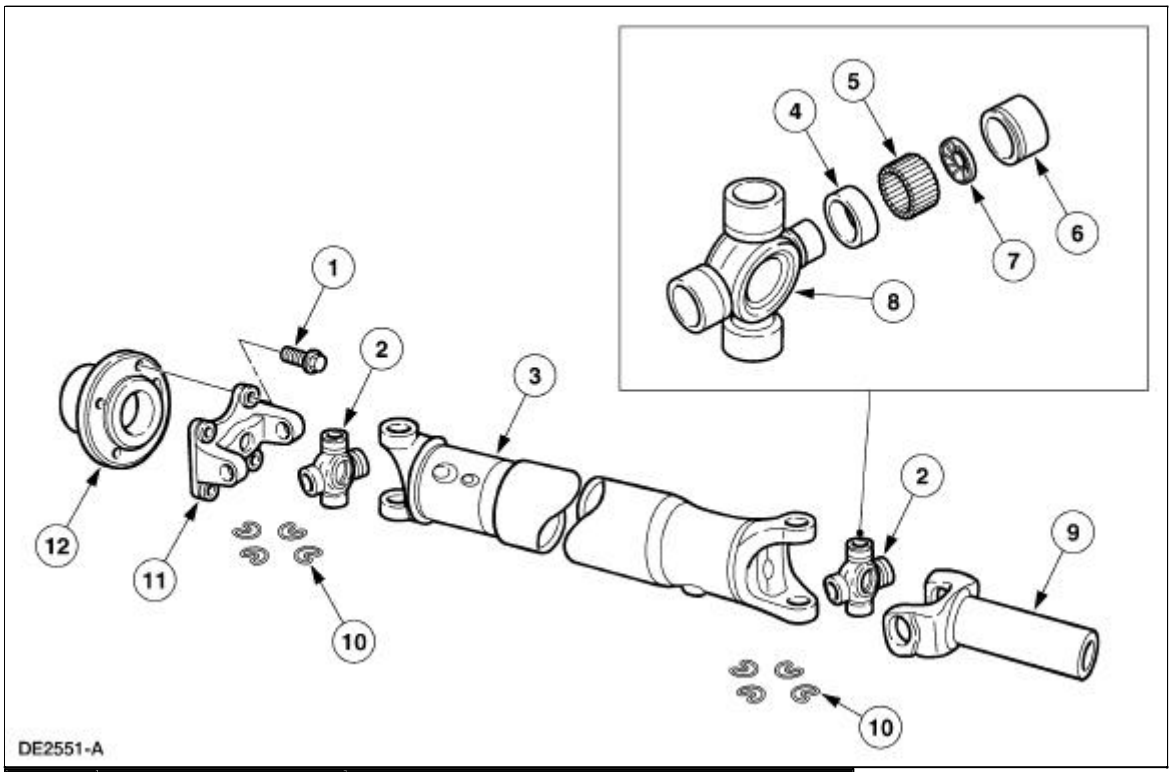
   - Use Devcon Aluminum Liquid F2 or equivalent meeting Ford specification M-3D35A(E).



Torque Specifications

Description	Nm	lb-ft
Pinion flange bolts	112	83

Driveshaft



Item	Part Number	Description
1	N800594-S100	Bolt (4 req'd)
2	4635	Universal joint (U-joint)
3	4602	Driveshaft
4	—	Grease seal (part of 4635)
5	—	Needle bearings (part of 4635)
6	—	Bearing cup (part of 4635)
7	—	Thrust washer (part of 4635)
8	—	Spider (part of 4635)
9	4841	Driveshaft slip yoke
10	—	Snap ring (4 req'd) (part of 4635)
11	4782	Driveshaft centering socket yoke
12	4851	Rear axle universal joint flange

NOTE: All driveshaft assemblies are balanced. If undercoating the vehicle, protect the driveshaft to prevent overspray of any undercoating material.

The driveshaft has the following features:

- A tubular shaft used to transfer engine torque from the transmission output shaft to the differential in the rear axle housing, which transmits torque through the axle shafts to the drive

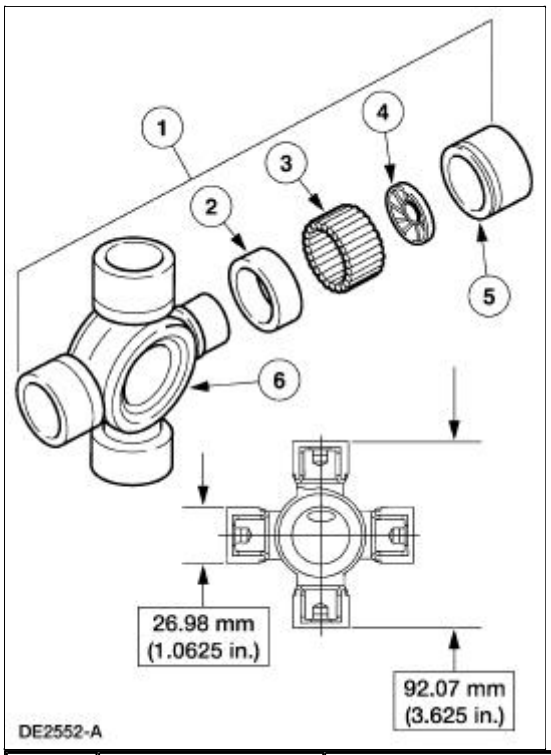
wheels.

- Consists of two single-cardan universal joints, a driveshaft slip yoke, a welded tube assembly and a driveshaft centering socket yoke.
- The splined driveshaft slip yoke permits the driveshaft to move forward and rearward on the transmission output shaft during drivetrain movement and during driveshaft removal and installation.

Universal Joints

The universal joints are:

- lubed-for-life design and require no lubrication.
- equipped with nylon thrust washers, located at each base of the bearing cup, which control end play, position the needle bearing and improve grease movement.



Item	Part Number	Description
1	4635	Universal joint (U-joint)
2	—	Grease seal (part of 4635)
3	—	32 needle bearings (part of 4635)
4	—	Thrust washer (part of 4635)
5	—	Bearing cup (part of 4635)
6	—	Spider (part of 4635)

Driveshaft

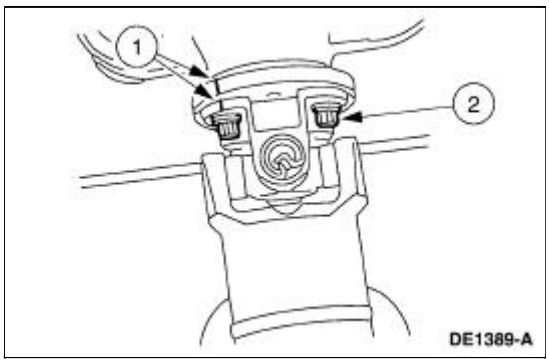
Material

Item	Specification
Threadlock® and Sealer E0AZ-19554-AA	WSK-M2G351-A5 (type II)

Removal and Installation

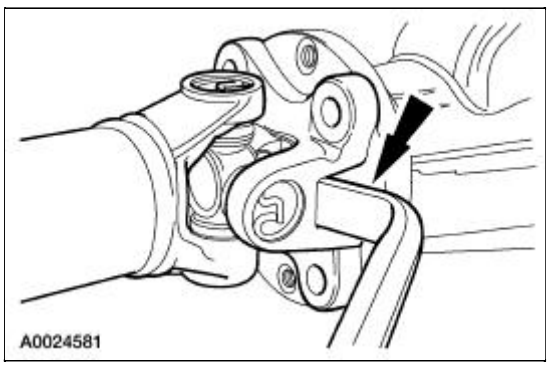
1. Raise and support the vehicle. For additional information, refer to Section 100-02 .

2. Carry out the following:
   1. Place an index mark on the rear axle pinion flange and the driveshaft centering socket yoke.
   2. Remove the four bolts.



3. **CAUTION: The driveshaft centering socket yoke fits tightly on the rear axle pinion flange pilot. Never hammer on the driveshaft or any of its components to disconnect the yoke from the flange. Pry only in the area shown, with a suitable tool, to disconnect the yoke from the flange.**

   Using a suitable tool as shown, disconnect the driveshaft centering socket yoke from the rear axle pinion flange.



4. **CAUTION: Do not allow the slip yoke to bottom on the transmission output shaft.**

Lower the rear end of the driveshaft to clear the rear axle housing. Pull the driveshaft rearward until the driveshaft slip yoke clears the transmission extension housing.

- Place a paint index mark on the driveshaft slip yoke and the transmission output shaft.
- Place a commercially available plug in the extension housing to prevent fluid leakage.

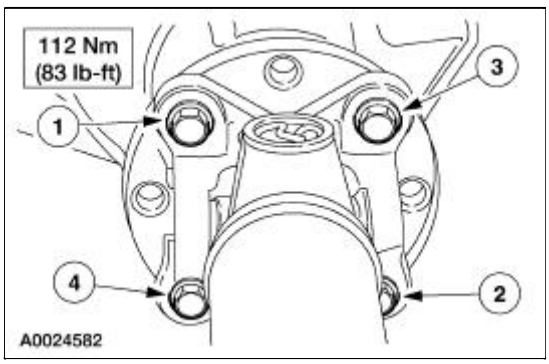
5. **CAUTION: Install the driveshaft with new bolts. If new bolts are not available, apply threadlock and sealer to the threads of the original bolts.**

   CAUTION: Do not allow the slip yoke to bottom on the transmission output shaft.

   CAUTION: The driveshaft centering socket yoke fits tightly on the rear axle pinion flange pilot. To make sure that the yoke seats squarely on the flange, tighten the bolts evenly in a cross pattern as shown.

   NOTE: Clean all foreign material from the yoke areas of the driveshaft.

   To install, reverse the removal procedure.



Driveshaft —Cobra

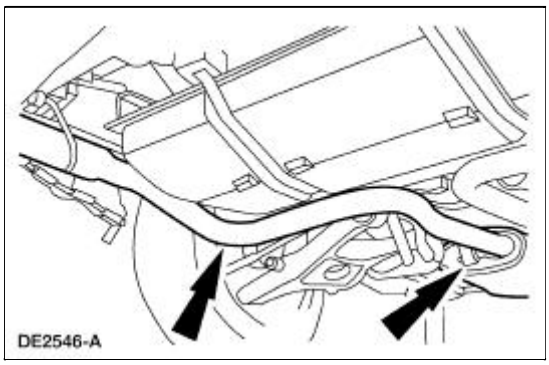
Material

Item	Specification
Threadlock® and Sealer E0AZ-19554-AA	WSK-M2G351-A5 (type II)
Silicone Lubricant (Aerosol) F5AZ-19553-AA	ESR-M13P4-A

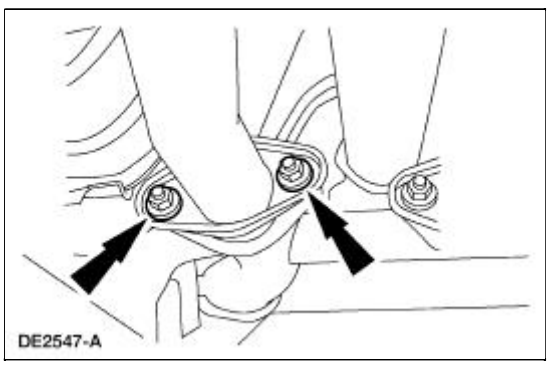
Removal and Installation

1. Raise and support the vehicle. For additional information, refer to Section 100-02 .
2. **NOTE:** To aid disassembly and assembly, lubricate the exhaust hangers with silicone lubricant.

   Remove the two exhaust hangers from the rubber mounts.

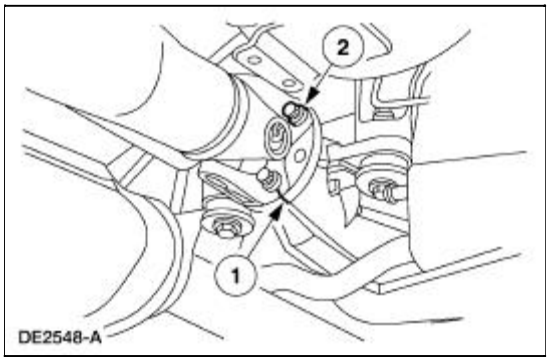


3. Remove the nuts on the left side exhaust.



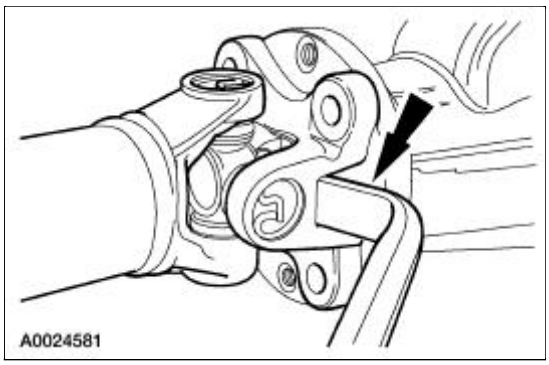
4. Lower the muffler pipe enough to clear the flange. Move the muffler assembly forward to disconnect the third exhaust hanger.
5. Carry out the following:
   1. Place an index mark on the rear axle pinion flange and the driveshaft centering socket yoke.

2. Remove the four bolts.



6. **CAUTION: The driveshaft centering socket yoke fits tightly on the rear axle pinion flange pilot. Never hammer on the driveshaft or any of its components to disconnect the yoke from the flange. Pry only in the area shown, with a suitable tool, to disconnect the yoke from the flange.**

   Using a suitable tool as shown, disconnect the driveshaft centering socket yoke from the rear axle pinion flange.



7. **CAUTION: Do not allow the slip yoke to bottom on the transmission output shaft.**

   Lower the rear end of the driveshaft to clear the rear axle housing. Pull the driveshaft rearward until the driveshaft slip yoke clears the transmission extension housing.

   - Place a paint index mark on the driveshaft slip yoke and the transmission output shaft.
   - Place a commercially available plug in the extension housing to prevent fluid leakage.

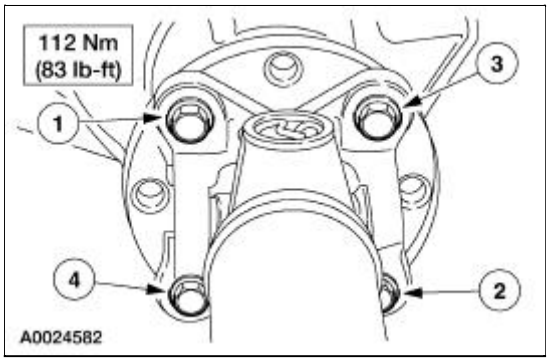
8. **CAUTION: Install the driveshaft with new bolts. If new bolts are not available, apply threadlock and sealer to the threads of the original bolts.**

   CAUTION: Do not allow the slip yoke to bottom on the transmission output shaft.

   CAUTION: The driveshaft centering socket yoke fits tightly on the rear axle pinion flange pilot. To make sure that the yoke seats squarely on the flange, tighten the bolts evenly in a cross pattern as shown.

   NOTE: Clean all foreign material from the yoke areas of the driveshaft.

   To install, reverse the removal procedure.


112 Nm
(83 lb-ft)
1
2
3
4
A0024582

Driveshaft Slip Yoke

Special Tool(s)

ST1172-A	Installer/Remover, C Frame and Screw 205-086 (T74P-4635-C)

Disassembly

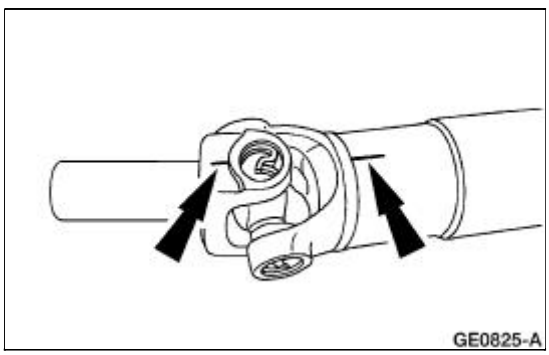
1. Remove the driveshaft (4602). For additional information, refer to Driveshaft in this section.

2. **CAUTION: Under no circumstances is the driveshaft assembly to be clamped in the jaws of a vise or similar holding fixture. Denting or localizing fracture can result, causing driveshaft failure during vehicle operation.**

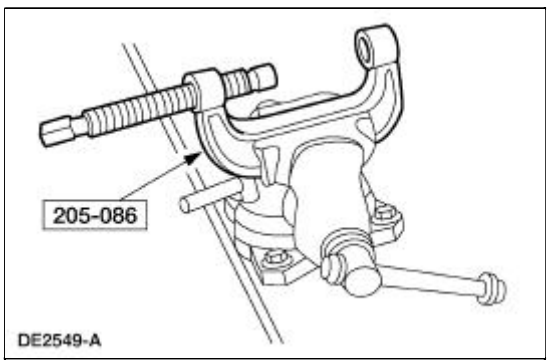
   Place the driveshaft (4602) on a suitable workbench. Be careful not to damage the tube.

3. **NOTE:** If components are not marked and therefore installed incorrectly, driveline imbalance can occur.

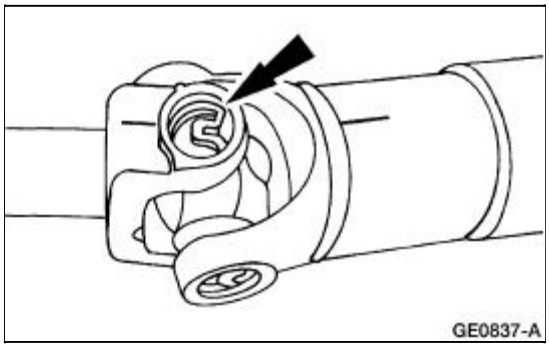
   Index-mark the driveshaft components.



4. Clamp the special tool in a vise.

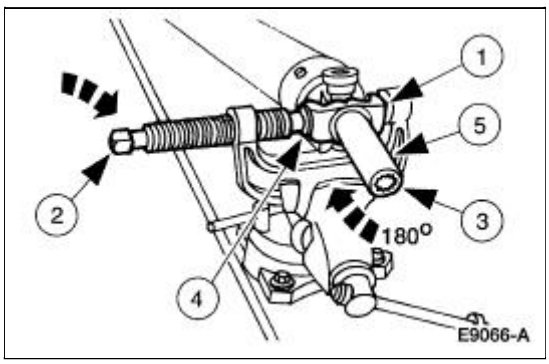


5. Remove all four of the snap rings.

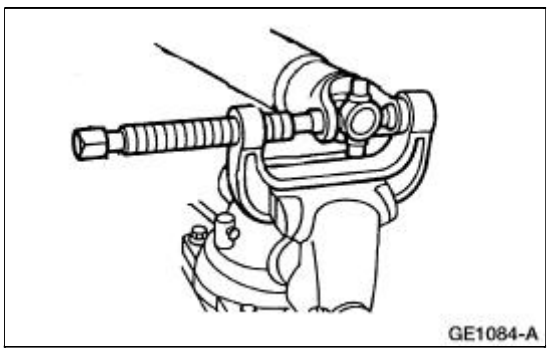


6. **NOTE:** If necessary, use a pair of pliers to remove a bearing cup if it cannot be pressed out all the way.

   Remove the driveshaft slip yoke (4841).
   1. Position the driveshaft slip yoke in the U-joint tool.
   2. Press out a bearing cup.
   3. Rotate the driveshaft slip yoke.
   4. Press on the spider to remove the remaining bearing cup.
   5. Remove the driveshaft slip yoke.



7. Repeat Step 5 to remove the remaining bearing cups and spider from the driveshaft.



8. Clean the yoke area at each end of the driveshaft.

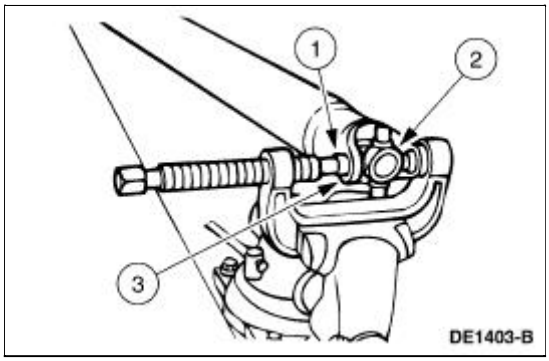
Assembly

1. **NOTE:** Universal joint service kits are to be installed as complete assemblies only. Do not mix components from other U-joint kits.

   Install the bearing cup.
   1. Start a new bearing cup into the driveshaft yoke.

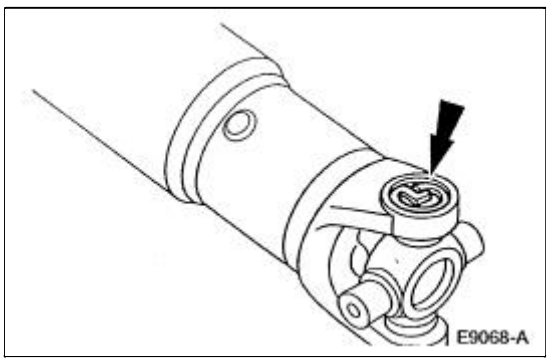
- Check the needle bearings for correct positioning.

2. Position the new spider in the driveshaft yoke.
3. Using the special tool, press the bearing cup to just below the snap ring groove.



2. **NOTE:** Use the yellow snap rings supplied in the kit to assemble the universal joint (U-joint). If difficulty is encountered with the yellow snap rings, install the black snap rings, as required.

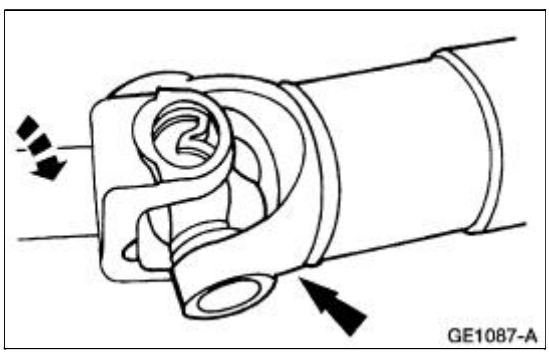
   Remove the driveshaft from the special tool, and install the snap ring.



3. Repeat Steps 1 and 2 to install the opposite side of the driveshaft yoke.
4. Inspect the driveshaft slip yoke. Install new if necessary.
5. Repeat Steps 1 and 2 to install the remaining new bearing cups, spider, driveshaft slip yoke, and the snap rings.
6. **NOTE:** Do not strike the bearings.

   Check the U-joints for freedom of movement.

   - If binding, strike the yoke with a brass or plastic hammer.



7. Install the driveshaft. For additional information, refer to Driveshaft in this section.

Universal Joint —Single Cardan, Flange Yoke

Special Tool(s)

ST1172-A	Installer/Remover, C Frame and Screw 205-086 (T74P-4635-C)

Disassembly

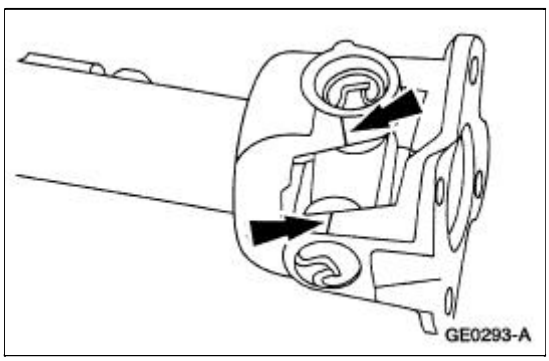
1. Remove the driveshaft (4602). For additional information, refer to Driveshaft in this section.

2. **CAUTION: Under no circumstances is the driveshaft assembly to be clamped in the jaws of a vise or similar holding fixture. Denting or localizing fracture can result, causing driveshaft failure during vehicle operation.**

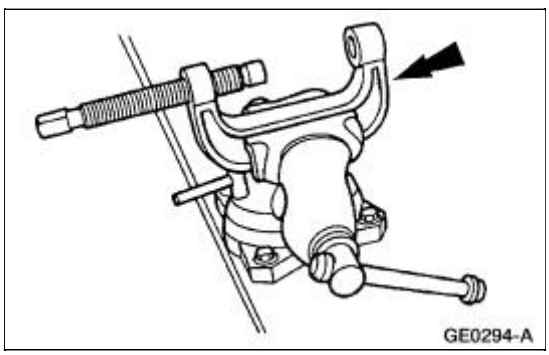
   Place the driveshaft on a suitable workbench, being careful not to damage the tube.

3. **NOTE:** If components are not marked and installed correctly, driveline imbalance can occur.

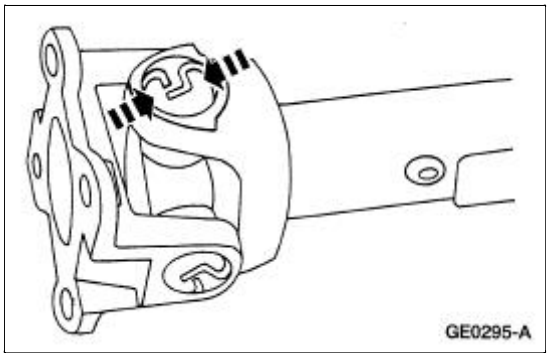
   Index-mark the positions of the driveshaft components.


GE0293-A

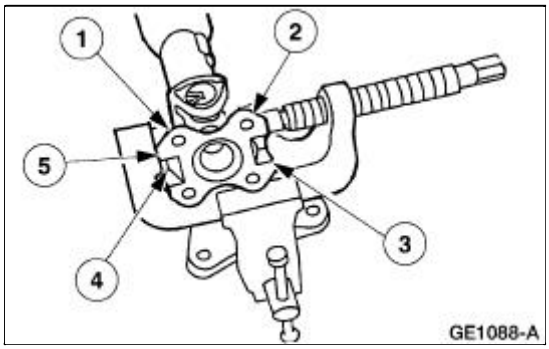
4. Clamp the U-joint tool in a vise.


GE0294-A

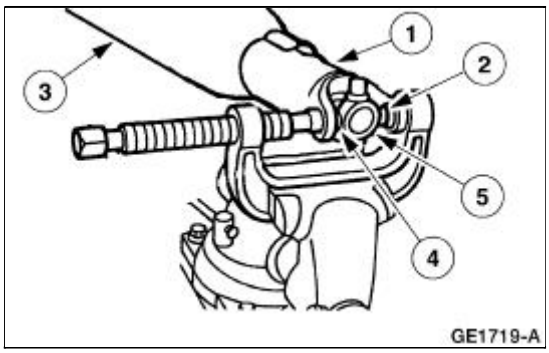
5. Remove all four of the snap rings.



6. Remove the driveshaft flange yoke.
    1. Position the driveshaft flange yoke in the U-joint tool.
    2. Press out a bearing cup.
    3. Remove the driveshaft flange yoke.
    4. Press on the spider to remove the remaining bearing cup.
    5. Remove the driveshaft flange yoke.



7. Remove the spider.
    1. Reposition the driveshaft in the U-joint tool.
    2. Press out the bearing cup.
    3. Rotate the driveshaft.
    4. Press on the spider to remove the remaining bearing cup.
    5. Remove the spider.



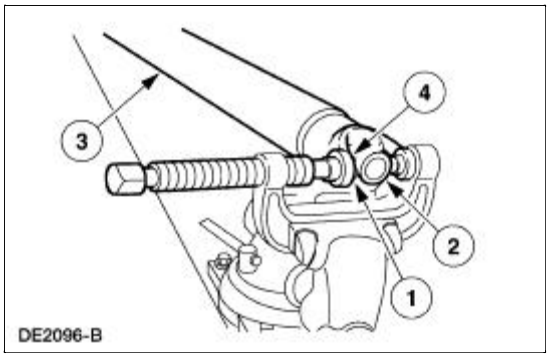
8. Clean the yoke area at the end of the driveshaft.

Assembly

1. **NOTE:** Universal joint kits are to be installed as complete assemblies only. Do not mix components from other U-joint kits.

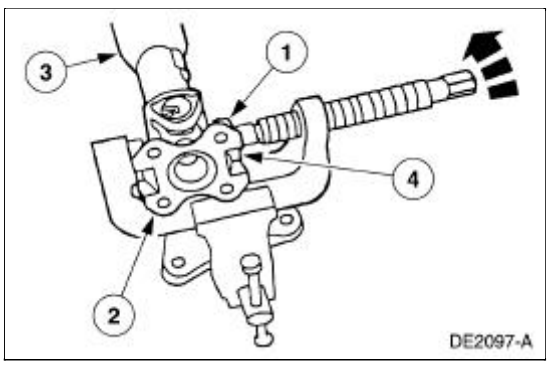
    Install the spider.
    1. Start a new bearing cup into the driveshaft yoke.
        - Check the needle bearings for correct positioning.

2. Position the new spider in the driveshaft yoke.
3. Position the driveshaft in the U-joint tool.
4. Press the bearing cup to just below the snap ring groove.
    - Repeat for the other bearing cup.



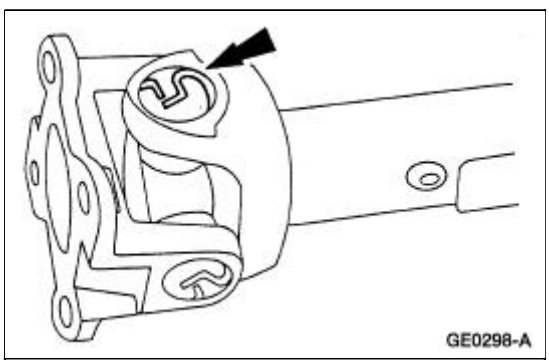
2. Inspect the driveshaft flange yoke. Install new if necessary.

3. Install the driveshaft flange yoke.
    1. Start a new bearing cup into the driveshaft flange yoke.
        - Check the needle bearings for correct positioning.
    2. Position the driveshaft flange yoke.
    3. Position the driveshaft in the U-joint tool.
    4. Press the bearing cup to just below the snap ring groove.
        - Repeat for the other bearing cup.



4. **NOTE:** Use the yellow snap rings supplied in the kit to assemble the universal joint (U-joint). If difficulty is encountered with the yellow snap rings, install the black snap rings, as required.

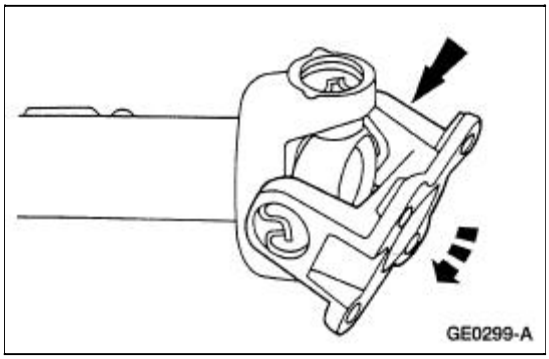
    Remove the driveshaft from the U-joint tool, and install the four snap rings.



5. **NOTE:** Do not strike the bearings.

Check the U-joints for freedom of movement.

- If binding, strike the yoke with a brass or plastic hammer.



6. Install the driveshaft. For additional information, refer to Driveshaft in this section.

General Specifications

Item	Specification
Lubes and Sealers	
SAE 80W-90 Premium Rear Axle Lubricant XY-80W90-QL	WSP-M2C197-A
Premium Long-Life Grease XG-1-C	ESA-M1C75-B
Rust Penetrant and Inhibitor F2AZ-19A501-A	ESR-M99C56-A
High Temperature Nickel Anti-Sieze Lubricant F6AZ-9L494-AA	ESE-M124A-A
Clear Silicone Rubber F7AZ-19554-CA	ESB-M4G92-A
Threadlock and Sealer EOAZ-19554-AA	WSK-M2G351-A5
Lubricant Fill Level Checks	
Approximate axle fill capacity [a]	1.54-1.66-liters (3.25-3.50-pints) 6.4-14.3-mm (1/4-9/16-in) below the bottom of the fill hole
Clearance, Tolerance and Adjustments	
Maximum ring gear back face runout	0.102 mm (0.004 in)
Maximum differential case runout	0.076 mm (0.003 in)
Differential side gear thrust washer thickness	0.762 mm - 0.813 mm (0.030 in - 0.032 in)
Differential pinion gear thrust washer thickness	0.762 mm - 0.813 mm (0.030 in - 0.032 in)
Maximum axle shaft end play	0.762 mm (0.030 in)
Ring gear backlash	0.203 mm-0.381 mm (0.008 in-0.015 in) [(0.305 mm-0.381 mm (0.012 in-0.015 in) preferred]
Variation between teeth maximum backlash	0.102 mm (0.004 in)
Pinion flange runout	0.25 mm (0.010 in) T.I.R.

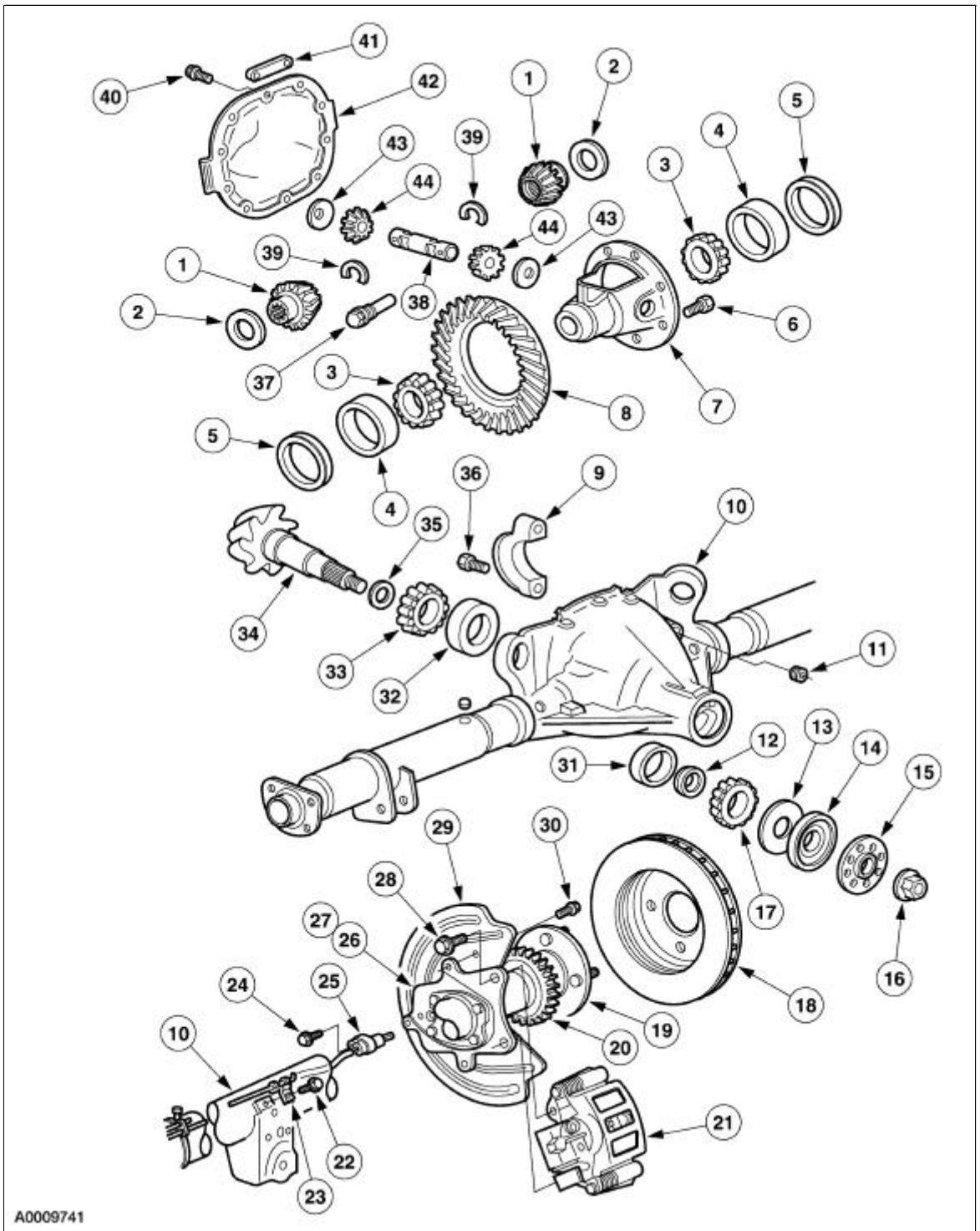
[a] In-vehicle repair refill capacities are determined by filling the rear axle with the specified lubricant to 6.4-14.3-mm (1/4-9/16-in) below the bottom of the fill hole.

Torque Specifications

Description	Nm	lb-ft	lb-in
Bolt retaining the differential pinion shaft to the differential case	30	22	—
Bolt retaining the driveshaft yoke to the pinion flange	112	83	—
Bolt retaining the differential housing cover to the differential housing	44	32	—
Oil filler plug	30	22	—
Pinion bearing preload (used pinion bearings)	0.9-1.5	—	8-14
Pinion bearing preload (new pinion bearings)	1.8-3.3	—	16-29
Adapter for 205-S127	2.2	—	20

Bolt retaining the bearing cap to the differential case	105	77	—
Bolt retaining the ring gear to the differential case	105	77	—

Rear Drive Axle and Differential



Item	Part Number	Description
1	4236	Differential side gear
2	4228	Differential side gear thrust washer
3	4221	Differential bearing

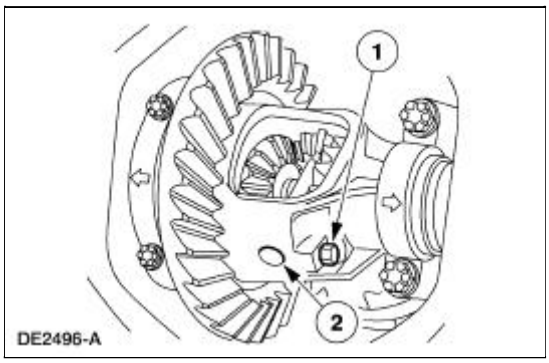
4	4222	Differential bearing cup
5	4067	Differential bearing shim
6	4216	Rear axle differential gear case bolt
7	4204	Differential case
8	—	Ring gear (part of 4209)
9	—	Bearing cap (part of 4010)
10	4010	Rear axle housing
11	373098-S	Filler plug
12	4662	Collapsible spacer
13	4670	Rear axle drive pinion shaft oil slinger
14	4676	Rear axle drive pinion seal
15	4851	Pinion flange
16	389546-S100	Pinion nut
17	4621	Differential pinion bearing
18	2C026	Rear brake disc
19	—	Axle shaft flange (part of 4234)
20	2C189	Rear brake anti-lock sensor indicator
21	2552	Rear disc brake caliper
22	N601951-S2	Bolt
23	N804361-S100	Clip
24	—	Bolt
25	2C190	Rear brake anti-lock sensor
26	2C101	Left hand rear disc brake adapter
27	2C100	Right hand rear disc brake adapter
28	N8015163-S190	Caliper anchor bolt
29	2C028	Rear wheel brake disc shield
30	N602726-S2	Bolt (3 req'd)
31	4616	Differential drive pinion bearing cup
32	4628	Rear axle pinion bearing cup
33	4630	Differential pinion bearing
34	—	Drive pinion gear (part of 4209)
35	4663	Drive pinion bearing adjustment shim
36	—	Bolt (part of 4010)
37	4241	Differential pinion shaft lock bolt
38	4211	Differential pinion shaft
39	4N237	U-washer
40	383548	Bolt
41	—	Rear axle identification tag
42	4033	Differential housing cover
43	4230	Differential pinion thrust washer
44	4215	Differential pinion gear

- The axle housing assembly consists of a cast center section with two steel tube assemblies and a stamped differential housing cover (4033). The differential housing cover uses silicone sealant as a gasket.
- The hypoid-design gearset consists of 7.5-inch ring gear (4209) and a drive pinion gear (4209). Two opposed tapered roller bearings support the drive pinion in the axle housing (4010).
- A collapsible spacer (4662), located on the differential pinion shaft, maintains pinion bearing preload. The pinion nut adjusts the preload.
- Differential bearing shims (4067), located between the differential bearing cups (4222) and the rear axle housing, adjust the differential bearing preload and the ring gear backlash.
- The differential case (4204) is a one-piece design with two openings to allow for assembly of the internal components and lubricant flow. Two opposed tapered roller bearings (differential bearings) (4221) support the differential case in the axle housing. Removable bearing caps (4010) retain the differential assembly in the axle housing.
- Inside the differential case, the differential pinion shaft (4211) supports two differential pinion gears (4215). The pinion gears engage the differential side gears (4236), to which the axle shafts (4234) are splined. The differential pinion shaft lock bolt (4241) retains the differential pinion shaft in the differential case.
- An embossed metal tag, bolted to the differential housing cover, contains rear axle identification.

Axle Shaft

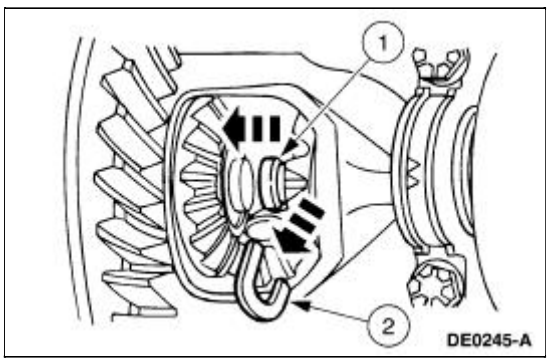
Removal

1. Raise and support the vehicle. For additional information, refer to Section 100-02 .
2. Remove the wheel and tire assembly. For additional information, refer to Section 204-04 .
3. Remove the rear brake disc (2C026). For additional information, refer to Section 206-04 .
4. Remove the differential housing cover (4033) and drain the lubricant. For additional information, refer to Differential Housing Cover in this section.
5. Remove the differential pinion shaft (4211).
    1. Remove the differential pinion shaft lock bolt (4241).
    2. Remove the differential pinion shaft.



6. **CAUTION: Do not damage the rubber O-ring in the axle shaft groove.**

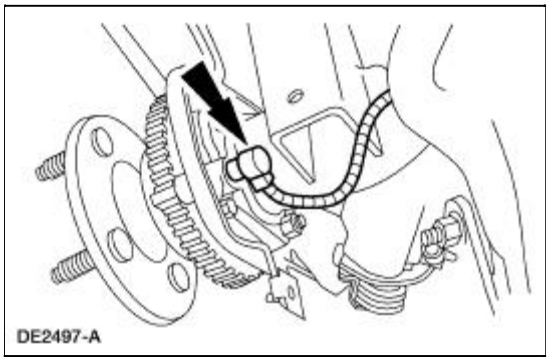
    Remove the U-washer (4N237).
    1. Push the axle shafts (4234) inboard.
    2. Remove the U-washer.



7. **CAUTION: Damage to the rear brake anti-lock sensor (2C190) may occur if it is not removed before the axle shaft.**

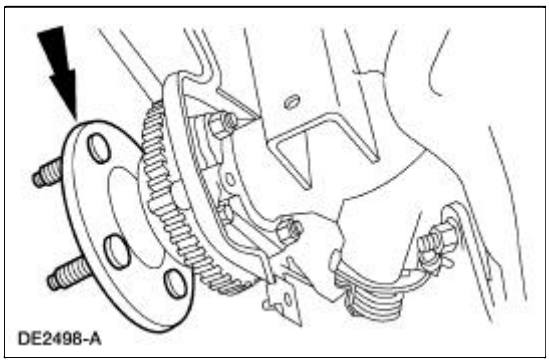
    Carefully remove the rear brake anti-lock sensor. For additional information, refer to Section

206-09A .



8. **CAUTION: Do not damage the wheel bearing oil seal.**

   Remove the axle shaft.

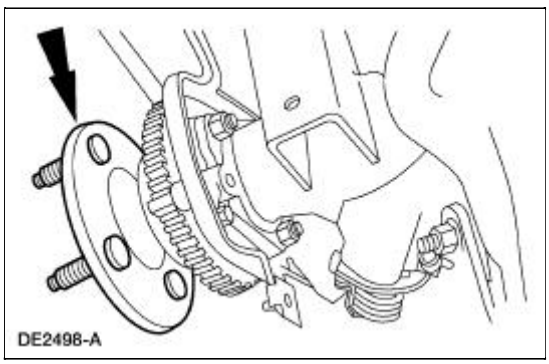


Installation

1. Lubricate the lip of the wheel bearing oil seal
   - Use Premium Long-Life Grease XG-1-C or equivalent meeting Ford specification ESA-M1C75-B.

2. **CAUTION: Do not damage the wheel bearing oil seal.**

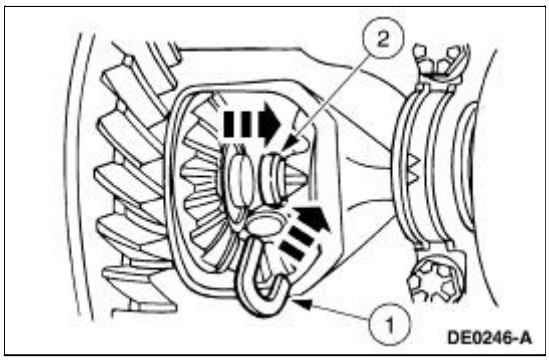
   Install the two axle shafts.



3. **CAUTION: Do not damage the rubber O-ring in the axle shaft groove.**

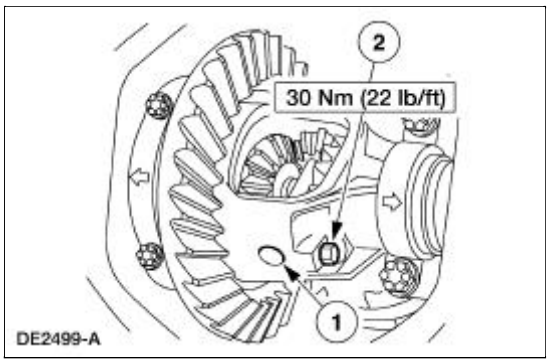
   Install the U-washer.

1. Position the two U-washers on the button end of the axle shaft.
2. Pull the axle shaft outward.



4. **NOTE:** If a new pinion shaft lock bolt is unavailable, coat the threads with Threadlock and Sealer EOAZ-19554-AA or equivalent meeting Ford specification WSK-M2G351-A5 prior to installation.

   Install the differential pinion shaft.
   1. Align the hole in the differential pinion shaft with the case lock bolt hole.
   2. Install a new differential pinion shaft lock bolt.



5. Install the differential housing cover and fill the rear axle with the specified lubrication. For additional information, refer to Differential Housing Cover in this section.

6. Install the rear brake anti-lock sensor. For additional information, refer to Section 206-09A .

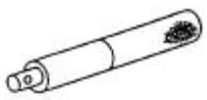
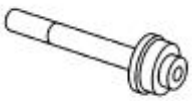
7. Install the rear brakes. For additional information, refer to Section 206-04 .

8. Install the tire and wheel assembly. For additional information, refer to Section 204-04 .

9. Lower the vehicle.

Rear Wheel Bearing and Axle Shaft Oil Seal

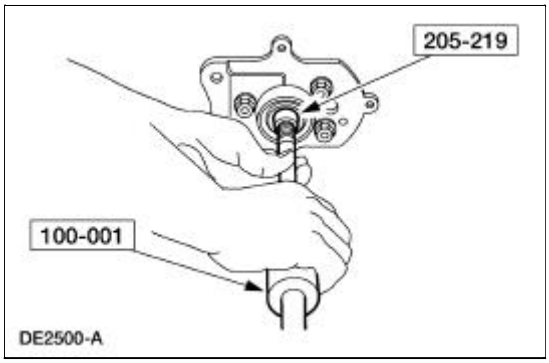
Special Tool(s)

 ST1326-A	Adapter for 303-224 205-153 (T80T-4000-W)
 ST1514-A	Installer, Axle Shaft Bearing 205-124 (T78P-1225-A)
ST2027-A	Installer, Rear Axle Oil Seal 205-390 (T97T-1177-B)
ST2035-A	Remover, Axle Bearing 205-219 (T85L-1225-AH)
ST1185-A	Slide Hammer 100-001 (T50T-100-A)

Removal

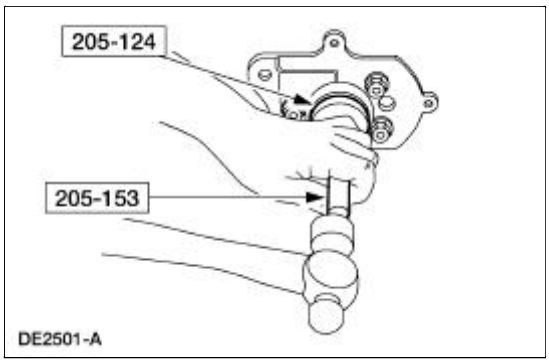
1. Remove the axle shaft (4234). For additional information, refer to Axle Shaft in this section.
2. **NOTE:** If the wheel bearing oil seal is leaking, the axle housing vent may be plugged.

   Using the special tools, remove the rear wheel bearing and wheel bearing oil seal.

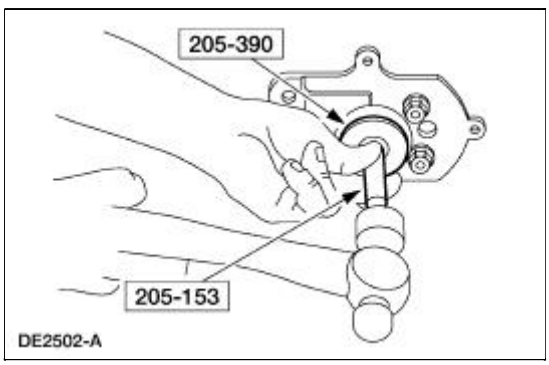


Installation

1. Lubricate the new rear wheel bearing with the specified lubricant.
2. Using the special tools, install the new rear wheel bearing.



3. Lubricate the lip of the new wheel bearing oil seal.
   - Use Premium Long-Life Grease XG-1-C or equivalent meeting Ford specification ESA-M1C75-B.
4. Using the special tools, install the new wheel bearing oil seal.



5. Install the axle shaft. For additional information, refer to Axle Shaft in this section.

Drive Pinion Flange and Drive Pinion Seal

Special Tool(s)

ST2026-A	2-Jaw Puller 205-D072 (D97L-4221-A) or equivalent
ST1257-A	Holding Fixture, Drive Pinion Flange 205-126 (T78P-4851-A)
ST1862-A	Installer, Drive Pinion Flange 205-002 (TOOL-4858-E) or equivalent

Removal

1. Raise and support the vehicle. For additional information, refer to Section 100-02 .
2. Remove the rear wheel and tire assemblies. For additional information, refer to Section 204-04 .
3. **CAUTION: Remove the rear brake calipers to prevent drag during the drive pinion bearing preload adjustment.**

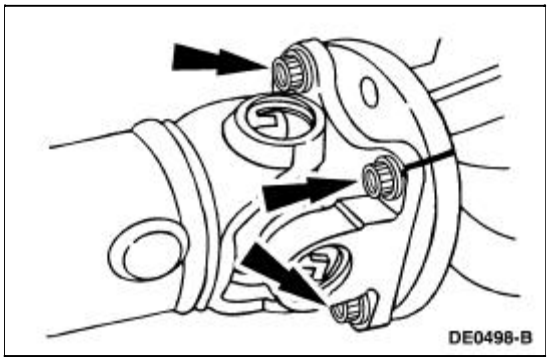
   CAUTION: Do not allow the calipers to hang from the brake hoses.

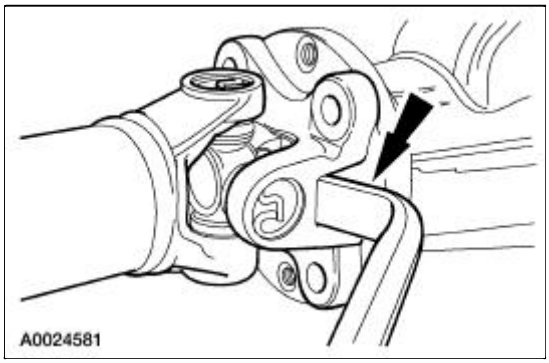
   Remove the rear brake caliper and support bracket from the knuckle as an assembly. Wire the caliper and support bracket assembly out of the way. For additional information, refer to Section 206-04 .
4. **CAUTION: Index-mark the driveshaft flange and pinion flange (4851) to maintain initial balance during installation.**

   CAUTION: The driveshaft centering socket yoke fits tightly on the pinion flange pilot. Never hammer on the driveshaft or any of its components to disconnect the yoke from the flange. Pry only in the area shown, with a suitable tool, to disconnect the yoke from the flange.

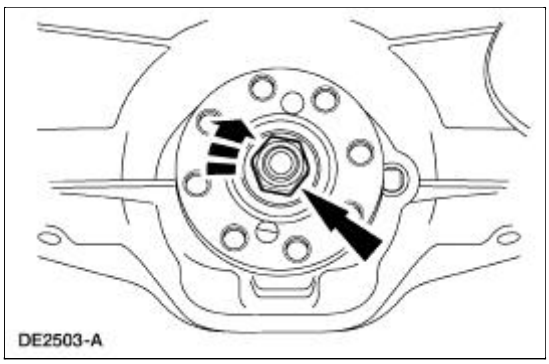
   Disconnect and position the driveshaft out of the way. For additional information, refer to

Section 205-01 .



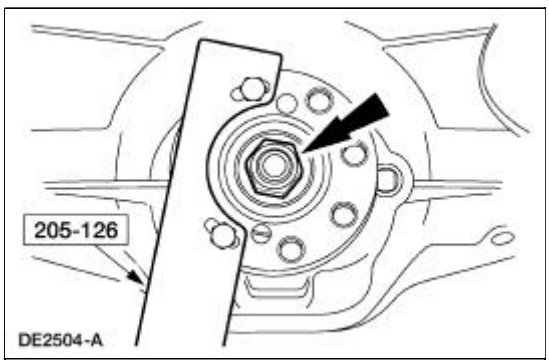


5. Install an Nm (inch/pound) torque wrench on the nut and record the torque necessary to maintain rotation of the drive pinion gear through several revolutions.



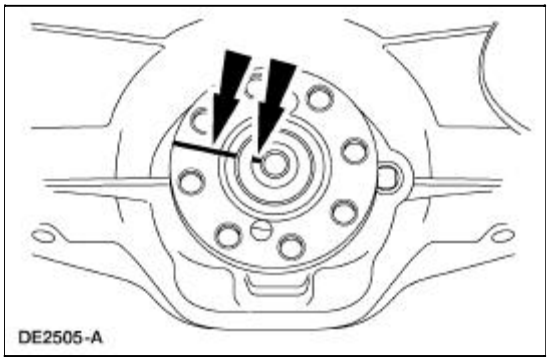
6. **CAUTION: After removing the nut, discard it. Use a new nut for installation.**

   Use the special tool to hold the pinion flange while removing the nut.

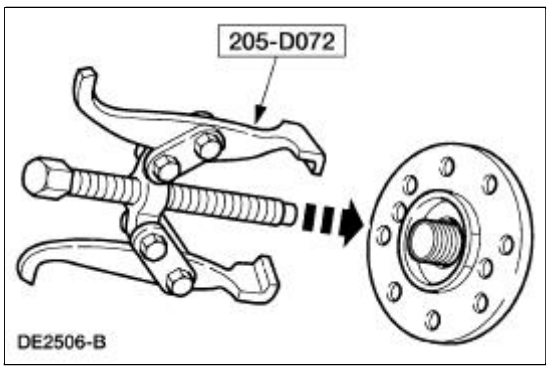


7. Index-mark the pinion flange and drive pinion gear stem to maintain initial balance during

installation.



8. Using the special tool, remove the pinion flange.



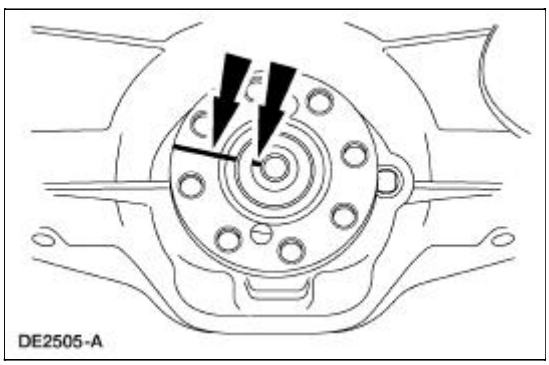
Installation

1. Inspect the pinion flange seal journal for rust, nicks, and scratches prior to installing the flange. Polish the seal journal with fine crocus cloth, if necessary.

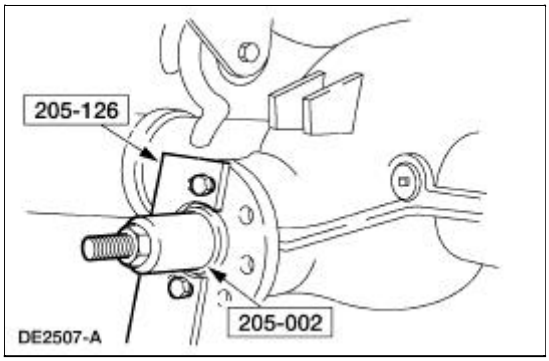
2. Lubricate the pinion flange splines.
   - Use SAE 80W-90 Premium Rear Axle Lubricant XY-80W90-QL or equivalent meeting Ford specification WSP-M2C197-A.

3. **NOTE:** Disregard the index marks if installing a new pinion flange.

   Position the pinion flange.



4. Using the special tools, install the pinion flange.

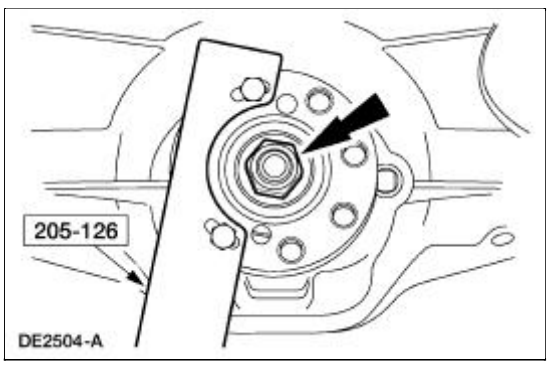


5. **CAUTION: Do not under any circumstance loosen the nut to reduce preload. If it is necessary to reduce preload, install a new collapsible spacer (4662) and nut.**

   CAUTION: Remove the special tool while taking preload readings with the Nm (inch/pound) torque wrench.

   Tighten the nut to set the preload.

   - Rotate the drive pinion occasionally to make sure the differential pinion bearings (4630) (4621) seat correctly. Take frequent differential pinion bearing torque preload readings by rotating the drive pinion with a Nm (inch/pound) torque wrench.
   - If the preload recorded prior to disassembly is lower than the specification for used bearings, then tighten the nut to specification. If the preload recorded prior to disassembly is higher than the specification for used bearings, then tighten the nut to the original reading as recorded.
   - Refer to the torque specification for used differential pinion bearings in the Specifications portion of this section.

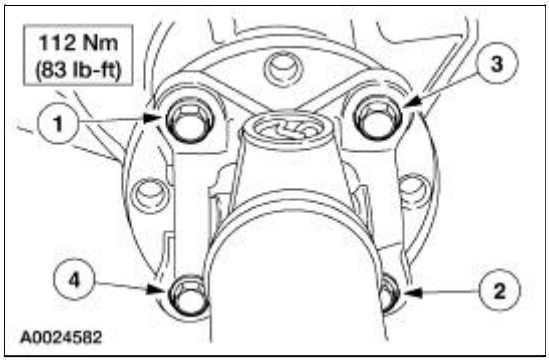


6. **CAUTION: Align the index marks.**

   CAUTION: Install the driveshaft with new bolts. If new bolts are not available, apply Threadlock and Sealer EOAZ-19554-AA or equivalent meeting Ford specification WSK-M2G351-A5 to the threads of the original bolts.

   CAUTION: The driveshaft centering socket yoke fits tightly on the pinion flange pilot. To make sure that the yoke seats squarely on the flange, tighten the bolts evenly in a cross pattern as shown.

   Connect the driveshaft. For additional information, refer to Section 205-01 .



7. Install the rear brake calipers. For additional information, refer to Section 206-04 .
8. Install the rear wheel and tire assemblies. For additional information, refer to Section 204-04 .
9. Lower the vehicle.

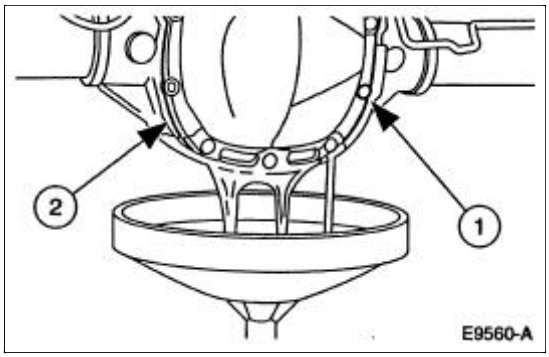
Differential Housing Cover

Removal

1. Raise and support the vehicle. For additional information, refer to Section 100-02 .

2. **NOTE:** Empty the lubricant into a clean container for reuse.

   Remove the differential housing cover (4033).
   1. Remove the 10 bolts and drain the lubricant from the differential housing (4010).
   2. Remove the differential housing cover.



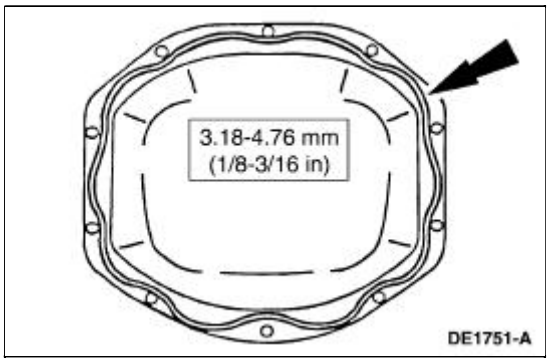
Installation

1. **CAUTION: Make sure the machined surfaces on both the differential housing and the differential housing cover are clean and free of oil before applying the new silicone sealant. To prevent contamination, cover the inside of the rear axle (4001) prior to cleaning the machined surface.**

   Clean the differential housing and the differential housing cover gasket mating surfaces.

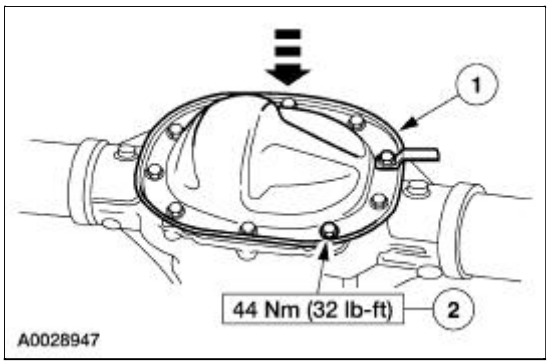
2. **CAUTION: Install the differential housing cover within 15 minutes of applying the silicone, or it will be necessary to remove and reapply new sealant.**

   Apply a continuous bead of sealant of the specified thickness to the differential housing cover.
   - Use Clear Silicone Rubber F7AZ-19554-CA or equivalent meeting Ford specifications ESB-M4G92-A.



3. **NOTE:** If possible, allow one hour before filling the axle with lubricant to make sure the silicone sealant has cured.

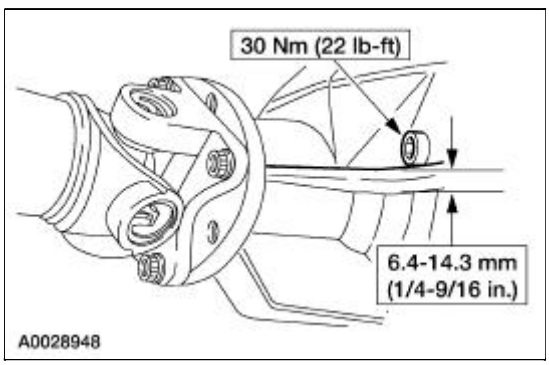
   Install the differential housing cover.
   1. Install the differential housing cover.
   2. Install the 10 bolts.



4. **NOTE:** In-vehicle repair refill capacities are determined by filling the rear axle with the specified lubricant to 6.4-14.3-mm (1/4-9/16-in) below the bottom of the fill hole.

   Fill the rear axle to the level shown, approximately 1.54-1.66-liters (3.25-3.50-pints) of lubricant, and install the filler plug.

   - Use SAE 80W-90 Premium Rear Axle Lubricant XY-80W90-QL or equivalent meeting Ford specification WSP-M2C197-A.



5. Lower the vehicle.

Axle Housing Bushing

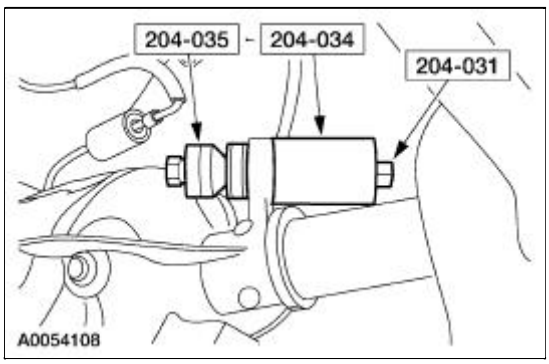
Special Tool(s)

ST2304-A	Axle Suspension Bushing Set 204-S030 (T78P-5638-A)

Removal

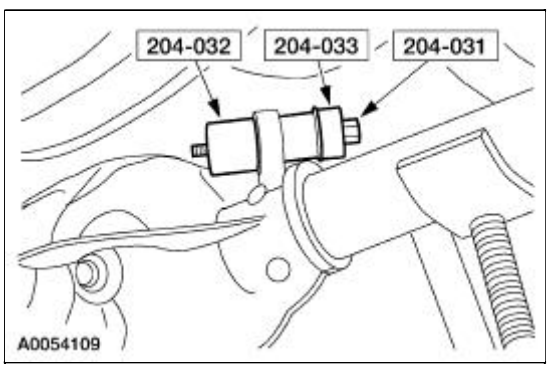
CAUTION: Suspension fasteners are critical parts because they affect performance of vital components and systems and their failure can result in major service expense. A new part with the same part number must be installed if installation becomes necessary. If substitution is necessary, the part must be of the same finish and property class. Torque values must be used as specified during reassembly to make sure of correct retention of these parts.

1. Remove the upper arm and bushing (5500). For additional information, refer to Section 204-02 .
2. Using the special tools, remove the bushing.

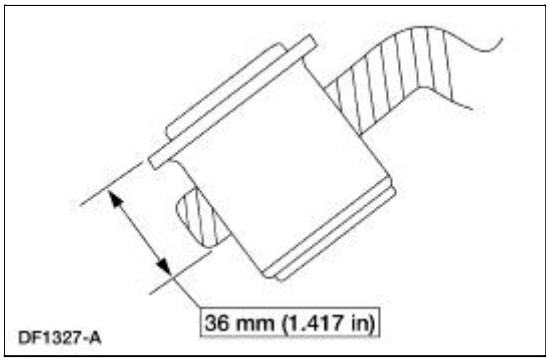


Installation

1. Using the special tools, install the bushing.



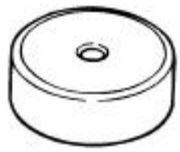
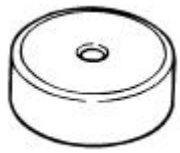
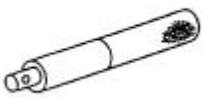
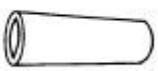
2. Using a suitable calibrated micrometer, measure the bushing as shown. If not within specifications, adjust as necessary.

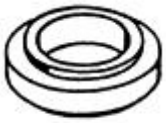
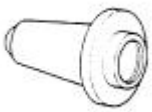
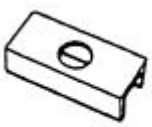
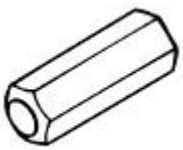


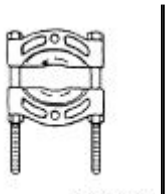
3. Install the upper arm and bushing. For additional information, refer to Section 204-02 .

Drive Pinion

Special Tool(s)

 ST1743-A	Adapter for 205-S127 205-105 (T76P-4020-A3)
ST1429-A	Adapter for 205-S127 205-109 (T76P-4020-A9)
ST1431-A	Adapter for 205-S127 205-110 (T76P-4020-A10)
ST1432-A	Adapter for 205-S127 205-111 (T76P-4020-A11)
 ST1743-A	Adapter for 205-S127 205-125 (T78P-4020-A15)
 ST1326-A	Adapter for 303-224 205-153 (T80T-4000-W)
 ST1434-A	Gauge Tube 205-D034 (D80T-4020-F49) or equivalent
	Handle (Long) 205-D055 (D81L-4000-A) or

ST1653-A	equivalent
ST1257-A	Holding Fixture, Drive Pinion Flange 205-126 (T78P-4851-A)
 ST1367-A	Installer, Drive Pinion Bearing Cone 205-005 (T53T-4621-C)
ST1678-A	Installer, Drive Pinion Bearing Cup 205-054 (T71P-4616-A)
ST1862-A	Installer, Drive Pinion Flange 205-002 (TOOL-4858-E) or equivalent
 ST1325-A	Installer, Drive Pinion Oil Seal 205-133 (T79P-4676-A)
 ST1254-A	Plate, Bearing/Oil Seal 205-090 (T75L-1165-B)
 ST1744-A	Protector, Drive Pinion Thread 205-460
	Puller, Bearing 205-D064 (D84L-1123-A) or equivalent



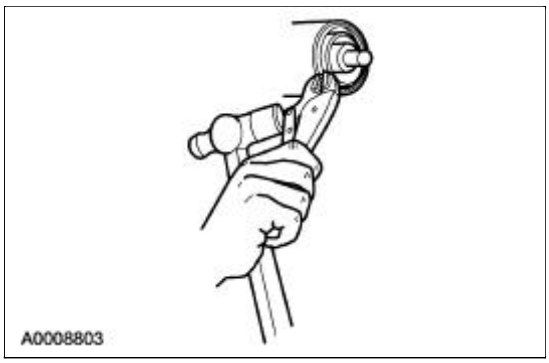
Removal

1. Remove the differential assembly from the differential housing. For additional information, refer to Differential Case in this section.

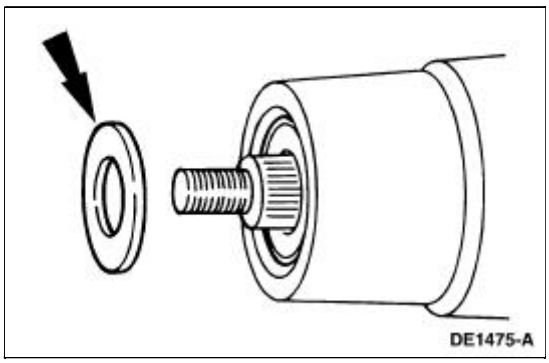
2. **CAUTION: Record the torque necessary to maintain rotation of the drive pinion gear through several revolutions prior to removing the pinion flange (4851).**

   Remove the pinion flange. For additional information, refer to Drive Pinion Flange and Drive Pinion Seal in this section.

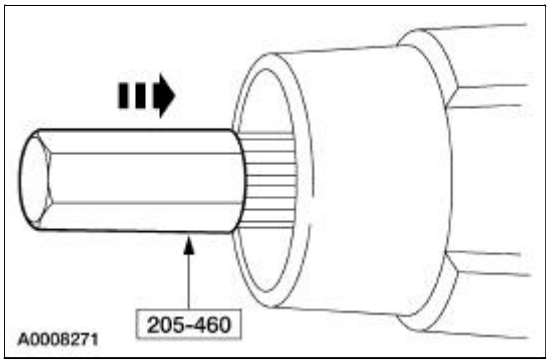
3. Force the rear axle drive pinion seal metal flange up. Install gripping pliers and strike with a hammer to remove the seal.



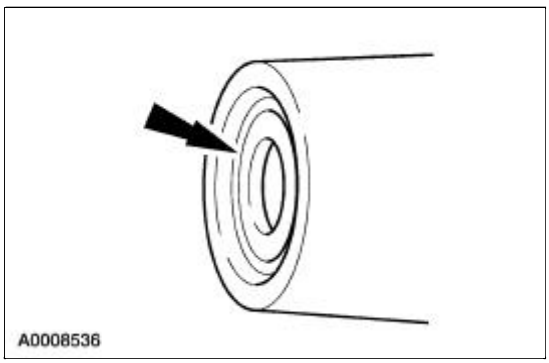
4. Remove the rear axle drive pinion shaft oil slinger (4670).



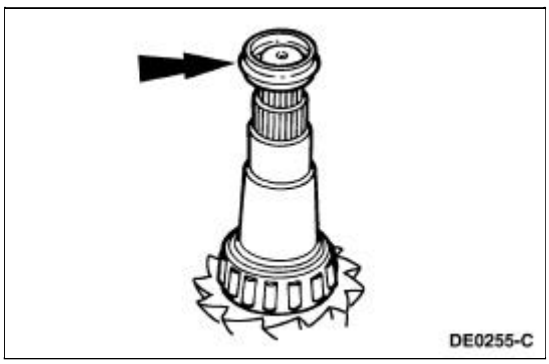
5. Using the special tool and a soft-faced hammer, drive the pinion assembly out of the outer differential pinion bearing (4621) and remove the drive pinion through the rear of the differential housing (4010).



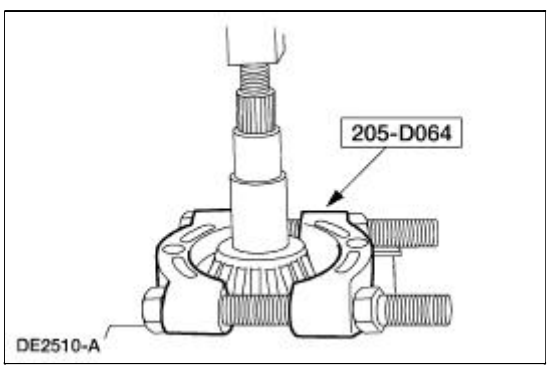
6. Remove the outer differential pinion bearing.



7. Remove and discard the collapsible spacer (4662).



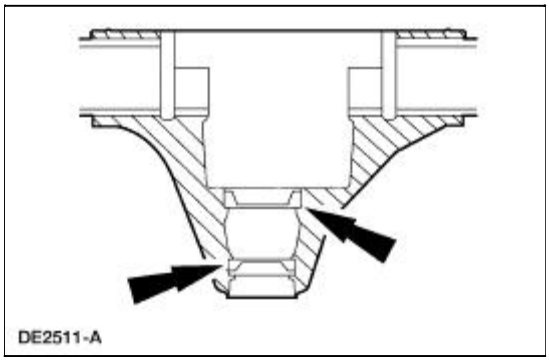
8. Using the special tool and a suitable press, remove the inner differential pinion bearing (4630).



9. **NOTE:** Do not remove the pinion bearing cups from the differential housing unless the cups are damaged.

   To remove the bearing cups, tap alternately (with a brass drift of suitable length) on opposite

sides of the cup to prevent the cup from cocking in the casting.

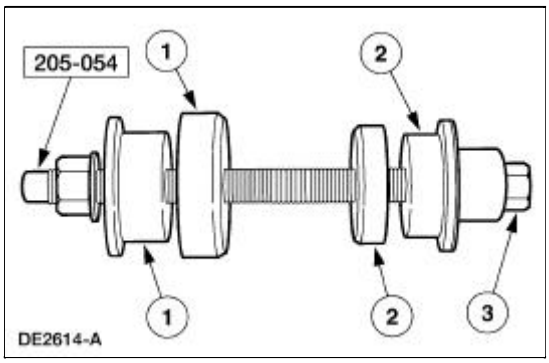


Installation

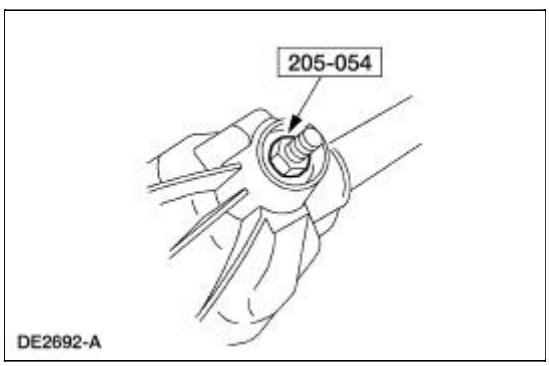
Using special tool 205-054

NOTE: This is the preferred method for installing the pinion bearing cups. If necessary, proceed to Using special tools 205-153, 205-054, and 205-D055 in this procedure for an alternate method.

1. Position the special tools and the inner and outer pinion bearing cups in their respective bores.
    1. After placing the inner and outer bearing cups in their bores, place the special tool on the inner bearing cup.
    2. Place the special tool on the outer bearing cup.
    3. Install the special tool.



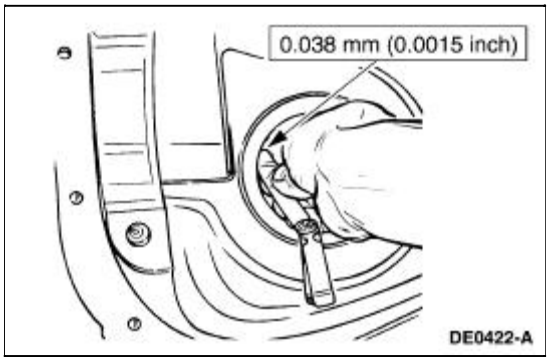
2. Tighten the special tool to seat the pinion bearing cups in their bores.



3. **CAUTION: Always install new differential pinion bearings when installing new pinion bearing cups.**

    NOTE: If the feeler gauge can fit between a cup and the bottom of its bore at any point around the cup, remove and reseat the cup.

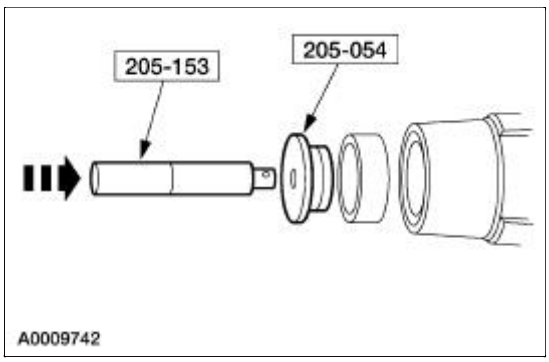
Check that the cups have seated correctly in their bores.



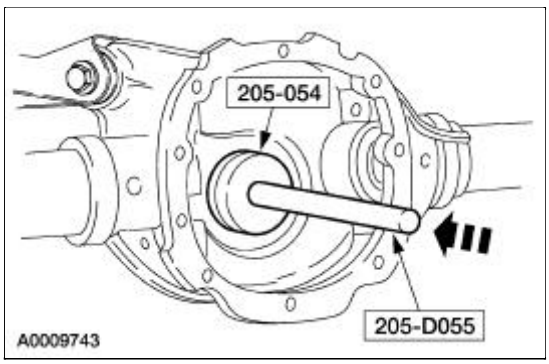
Using special tools 205-153, 205-054, and 205-D055

NOTE: This is an alternate method for installing the pinion bearing cups. Carry out this procedure if pinion bearing cup installation was not done in the previous steps.

4. Using the special tools, drive the outer differential drive pinion bearing cup (4616) into the differential housing.



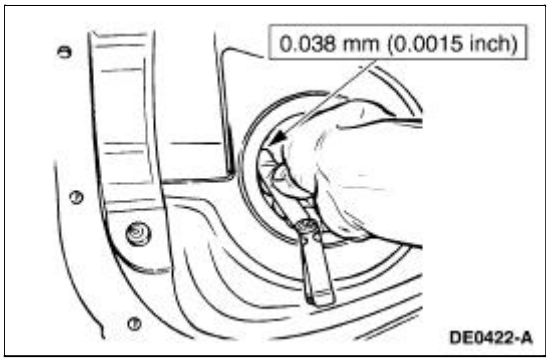
5. Using the special tools, drive the inner rear axle pinion bearing cup (4628) into the differential housing.



6. **CAUTION: Always install new differential pinion bearings when installing new pinion bearing cups.**

   NOTE: If the feeler gauge can fit between a cup and the bottom of its bore at any point around the cup, remove and reseat the cup.

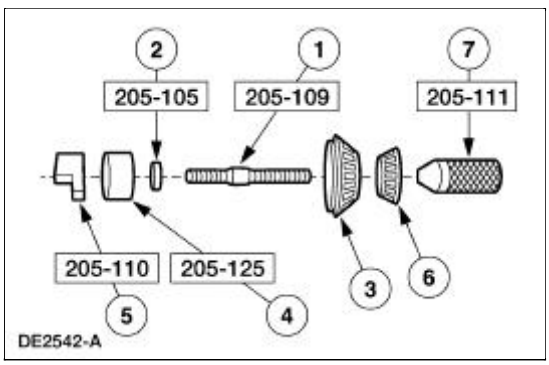
   Check that the cups have seated correctly in their bores.



Setting pinion depth

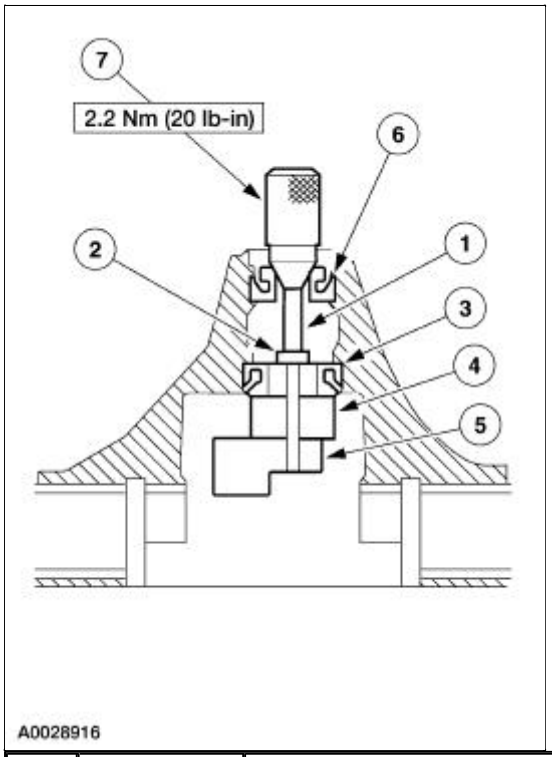
7. **NOTE:** Apply only a light oil film on the differential pinion bearings before assembling the tools.

   Assemble and position the following in the differential housing.
   1. Position the Adapter for 205-S127.
   2. Position the Adapter for 205-S127.
   3. Position the inner pinion bearing.
   4. Position the Adapter for 205-S127.
   5. Position the Adapter for 205-S127.
   6. Position the outer pinion bearing.
   7. Thread on the Adapter for 205-S127.



8. **NOTE:** This step duplicates final differential pinion bearing preload.

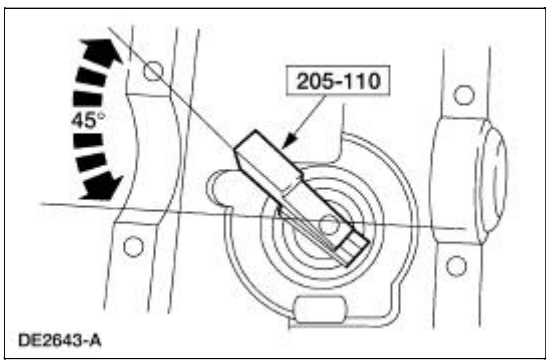
   Using a Nm (inch/pound) torque wrench, tighten the special tool to specification.



Item	Part Number	Description
1	205-109	Adapter for 205-S127 (T76P-4020-A9)
2	205-105	Adapter for 205-S127 (T76P-4020-A3) (1.612 inch O.D.)
3	4630	Rear (inner) pinion bearing
4	205-125	Adapter for 205-S127 (T78P-4020-A15) (0.894 inch thick)
5	205-110	Adapter for 205-S127 (T76P-4020-A10) (1.7 inch thick)
6	4621	Front (outer) pinion bearing
7	205-111	Adapter for 205-S127 (T76P-4020-A11)

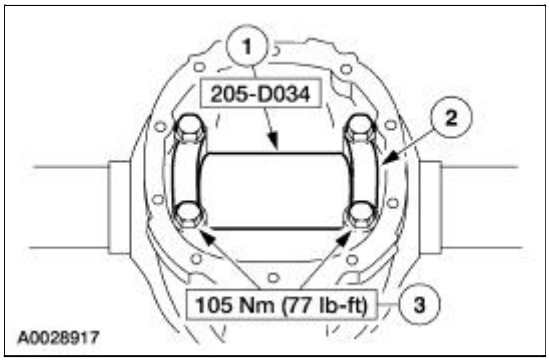
9. **NOTE:** Offset the special tool to obtain an accurate reading.

   Rotate the special tool several half-turns to make sure the differential pinion bearings seat correctly and position the special tool as shown.



10. Install the special tool.
    1. Position the special tool.

2. Install the bearing caps.
3. Install the four bolts.

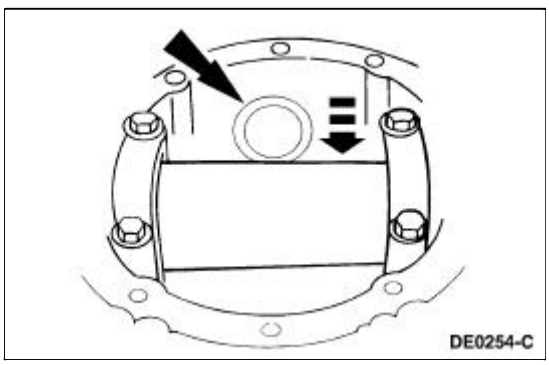


11. **NOTE:** Use only flat, clean drive pinion bearing adjustment shims (4663).

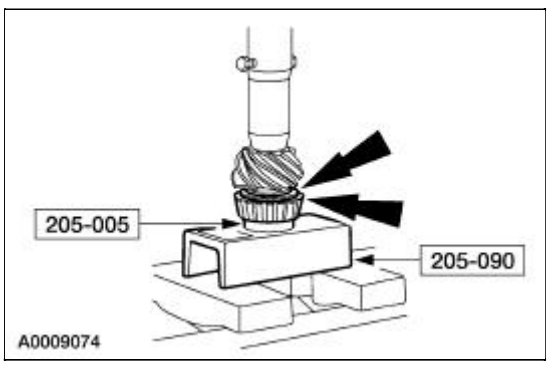
    NOTE: Selection of too thick a shim results in a deep tooth contact at final assembly. Do not attempt to force the shim between the special tools. A slight drag indicates correct shim selection.

    Use a drive pinion bearing adjustment shim as a gauge for shim selection.

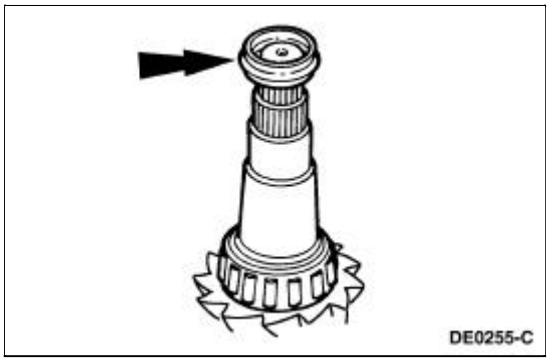
    - After determining the correct shim thickness, remove the special tools.



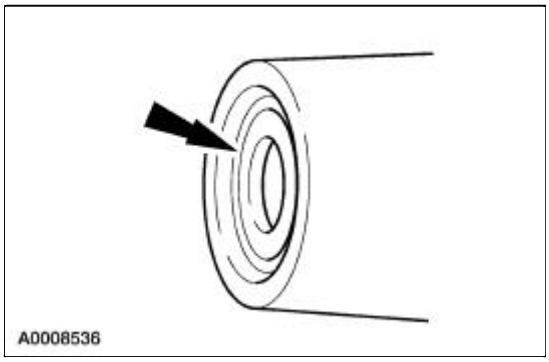
12. Position the correct thickness drive pinion bearing adjustment shim and the differential pinion bearing on the drive pinion gear. Using a suitable press and the special tools, press the differential pinion bearing until it seats firmly against the drive pinion gear.



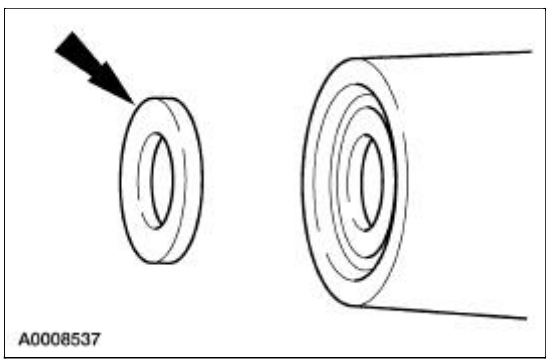
13. Place a new collapsible spacer on the pinion shaft against the pinion stem shoulder.



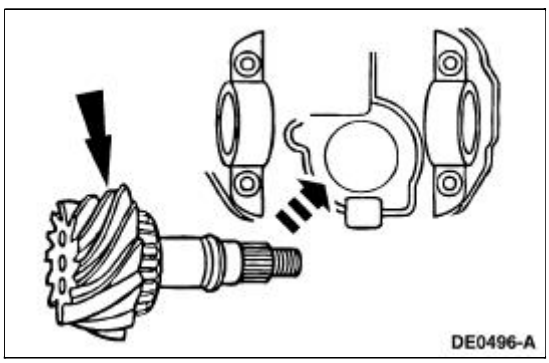
14. Install the outer differential pinion bearing.



15. Install the rear axle drive pinion shaft oil slinger.

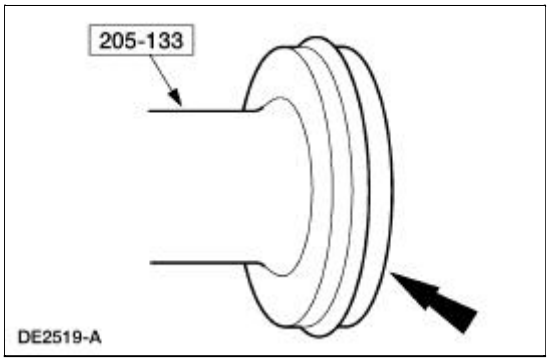


16. Install the drive pinion assembly (drive pinion, shims, bearing, and the collapsible spacer) into the differential housing bore.



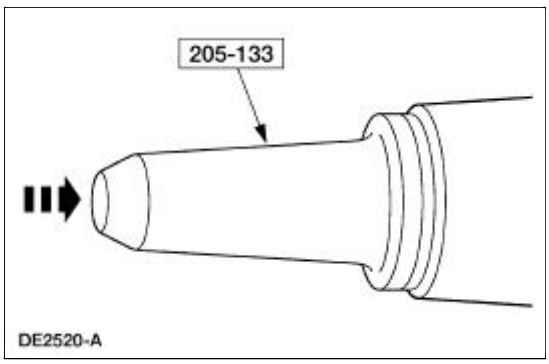
17. **NOTE:** Coat the rear axle drive pinion seal lips with Premium Long-Life Grease XG-1-C or equivalent meeting Ford specification ESA-M1C75-B.

    Place the rear axle drive pinion seal on the special tool.



18. **CAUTION: If the rear axle drive pinion seal becomes misaligned during installation, remove it and install a new one.**

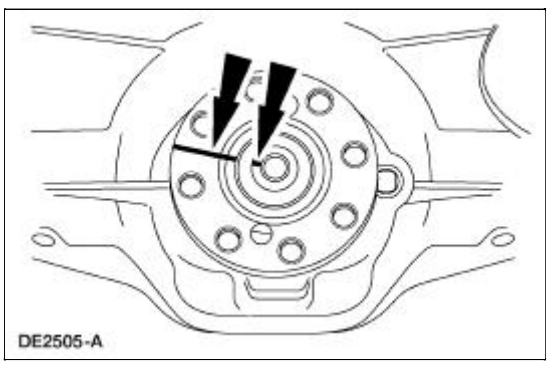
    Position the rear axle drive pinion seal in the seal bore, and use the special tool to drive the seal into place.



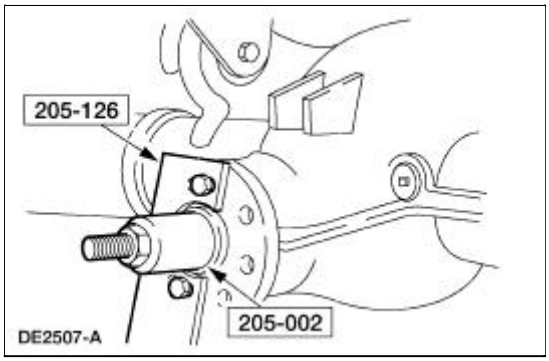
19. Lubricate the pinion flange splines.
    - Use SAE 80W-90 Premium Rear Axle Lubricant XY-80W90-QL or equivalent meeting Ford specification WSP-M2C197-A.

20. **NOTE:** Disregard the index marks if installing a new pinion flange.

    Position the pinion flange.



21. Using the special tools, install the pinion flange.

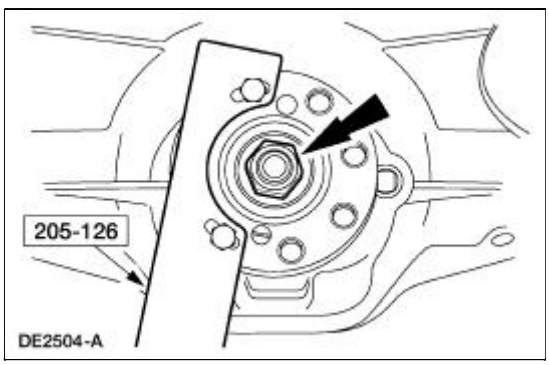


22. **CAUTION: Do not under any circumstance loosen the nut to reduce preload. If it is necessary to reduce preload, install a new collapsible spacer and nut.**

CAUTION: Remove the special tool while taking readings with the Nm (inch-pound) torque wrench.

Tighten the nut to set the preload.

- Rotate the drive pinion occasionally to make sure the differential pinion bearings seat correctly. Take frequent differential pinion bearing torque preload readings by rotating the drive pinion with a Nm (inch-pound) torque wrench.
- For new differential pinion bearings, tighten the nut to specification. Refer to torque specifications for new differential pinion bearings in the Specifications portion of this section.
- For used differential pinion bearings, if the preload recorded prior to disassembly is lower than the specification for used bearings, then tighten the nut to specification. Refer to torque specifications for used differential pinion bearings in the Specifications portion of this section.
- For used differential pinion bearings, if the preload recorded prior to disassembly is higher than the specification for used bearings, then tighten the nut to the original reading as recorded.



Final assembly

23. Install the differential assembly in the differential housing. For additional information, refer to Differential Case in this section.

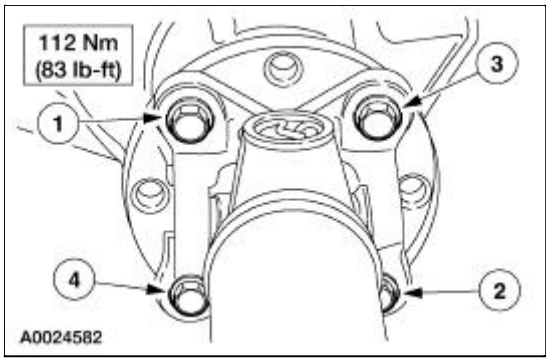
24. **CAUTION: Align the index marks.**

CAUTION: Install the driveshaft with new bolts. If new bolts are not available, apply Threadlock and Sealer EOAZ-19554-AA or equivalent meeting Ford specification WSK-

M2G351-A5 to the threads of the original bolts.

CAUTION: The driveshaft centering socket yoke fits tightly on the pinion flange pilot. To make sure that the yoke seats squarely on the flange, tighten the bolts evenly in a cross pattern as shown.

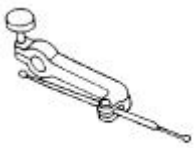
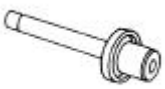
Connect the driveshaft. For additional information, refer to Section 205-01 .



25. Lower the vehicle.

Differential Case

Special Tool(s)

ST2026-A	2-Jaw Puller 205-D072 (D97L-4221-A) or equivalent
ST1214-A	Dial Indicator Gauge with Holding Fixture 100-002 (TOOL-4201-C) or equivalent
 ST1348-A	Gauge, Clutch Housing 308-021 (T75L-4201-A) or equivalent
ST1485-A	Installer, Differential Shim 205-220 (T85L-4067-AH)
 ST1375-A	Installer, Differential Side Bearing 205-009 (T57L-4221-A1)
ST1543-A	Step Plate 205-D016 (D80L-630-5) or equivalent

Removal

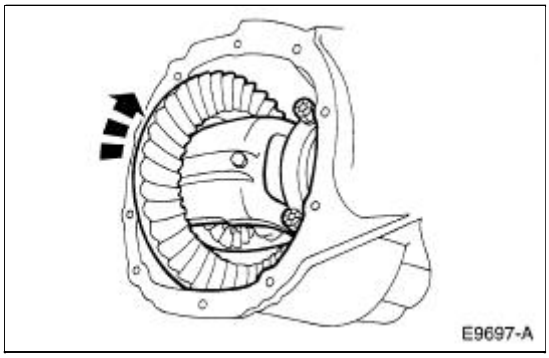
1. Remove the differential housing cover (4033) and drain the rear axle (4001). For additional information, refer to Differential Housing Cover in this section.

2. **CAUTION: Reinstall the differential pinion shaft (4211) and the bolt in the differential case (4204) after removing the axle shafts (4234).**

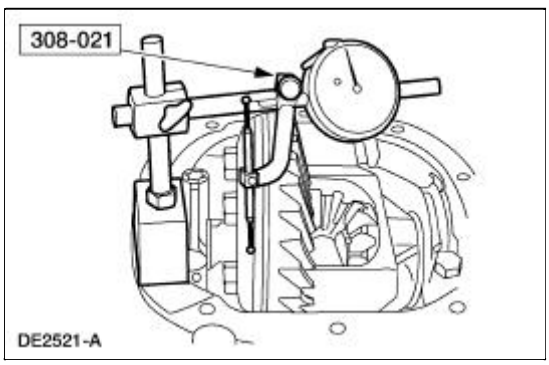
Remove the axle shafts. For additional information, refer to Axle Shaft in this section.

3. Wipe the lubricant from the internal working parts and inspect the parts for wear and damage.

4. Rotate the differential assembly to check for roughness indicating bearing/gear damage.

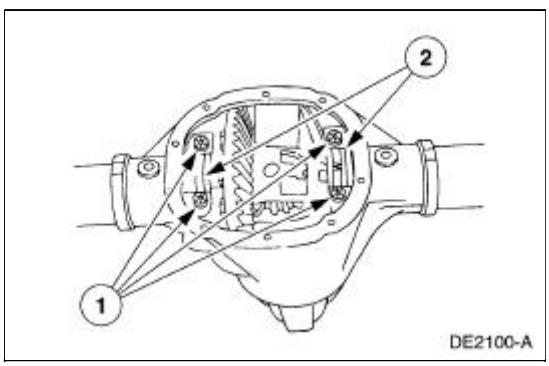


5. Using a suitable dial indicator and the special tool, measure and note the ring gear backface runout.



6. **CAUTION: Mark the position and location of the bearing caps, as the arrows may not be visible. Always install the bearing caps in their identical locations and positions.**

Remove the bearing caps.
1. Remove the bolts.
2. Remove the bearing caps.

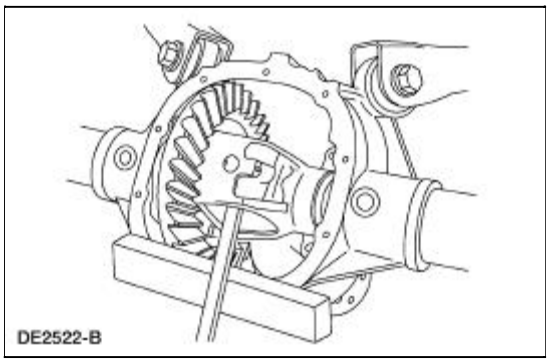


7. **WARNING: Do not allow the differential assembly to fall. Failure to follow these instructions may result in personal injury and component damage.**

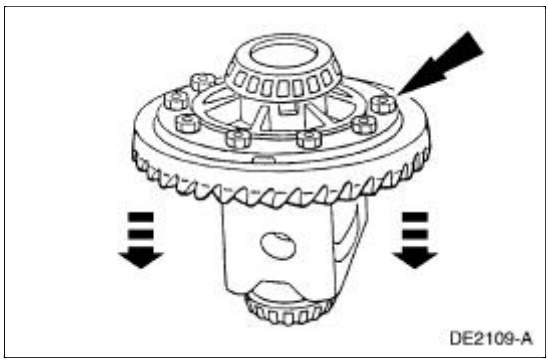
CAUTION: Place a wood block between the pry bar and the differential housing

(4010) to protect the machined surface from damage.

Using a pry bar and a wood block, remove the differential assembly from the differential housing.

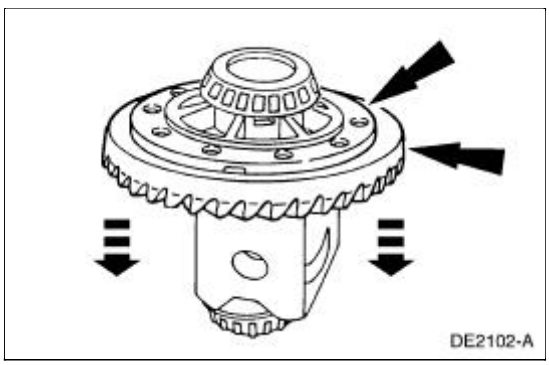


8. Remove the 10 bolts.



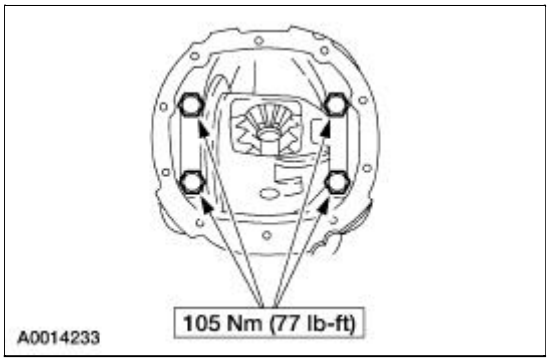
9. **CAUTION: Do not damage the threads in the bolt holes.**

   Insert a punch in the bolt holes, and drive off the ring gear.

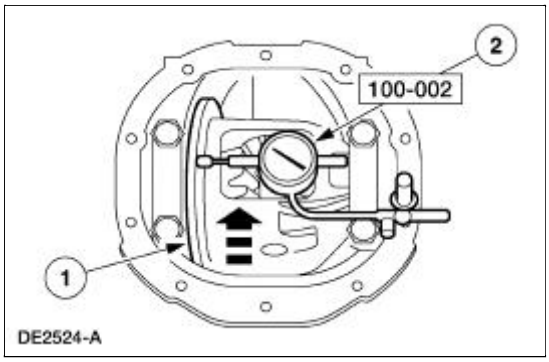


10. If the ring gear backface runout measurement, taken at the beginning of this procedure, did not exceed the specification, proceed to the appropriate procedure as necessary: Drive Pinion , Differential Case and Ring Gear in this section, or to Installation in this procedure. If the ring gear backface runout measurement, taken at the beginning of this procedure, exceeds the specification, the cause may be a warped ring gear, differential case/differential bearing damage. Proceed as follows to verify the cause of the excessive runout.

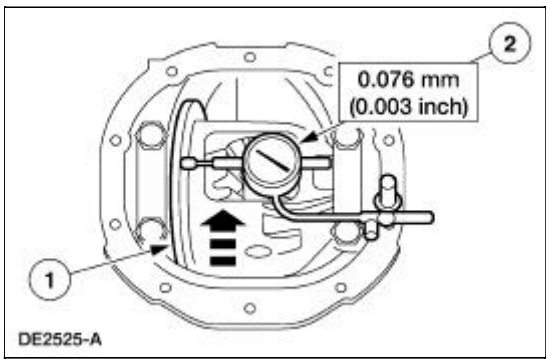
11. Position the differential assembly, including the differential bearing cups (4222) and differential bearing shims (4067), in the differential housing. Install the bearing caps and bolts.



12. Position the special tool.
    1. Rotate the differential case to verify that the differential bearings (4221) have seated correctly.
    2. Position the special tool.

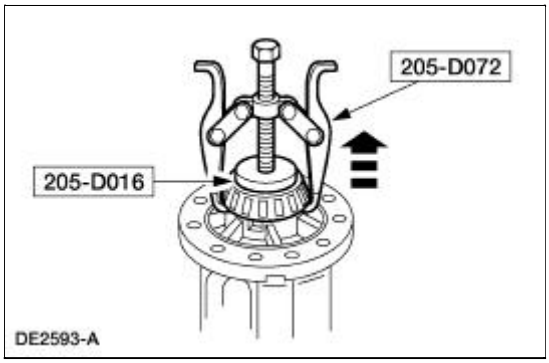


13. Measure and note the differential case runout.
    1. Rotate the differential case.
    2. Note the runout.
        - If the runout does not exceed the specification, install a new ring gear and drive pinion gear. For additional information, refer to Drive Pinion in this section and to Installation in this procedure.
        - If the runout exceeds the specification, the ring gear is true and the concern is due to either differential case/differential bearing damage. Proceed as follows.

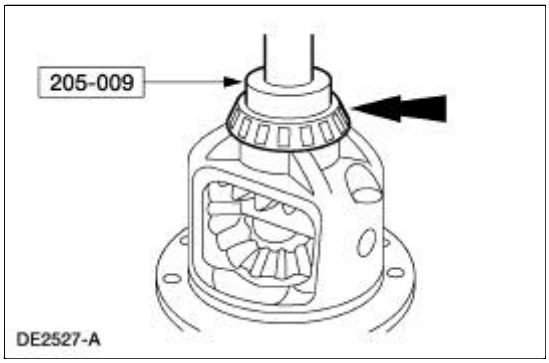


14. Remove the differential assembly from the differential housing.

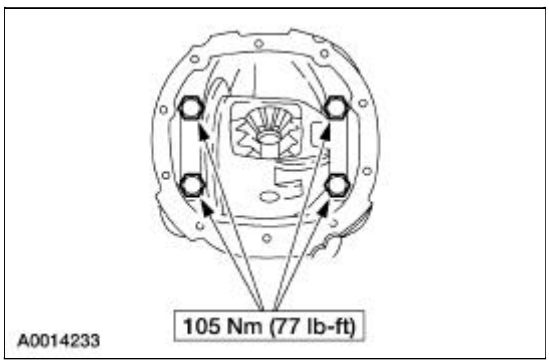
15. Using the special tools, remove the differential bearings.



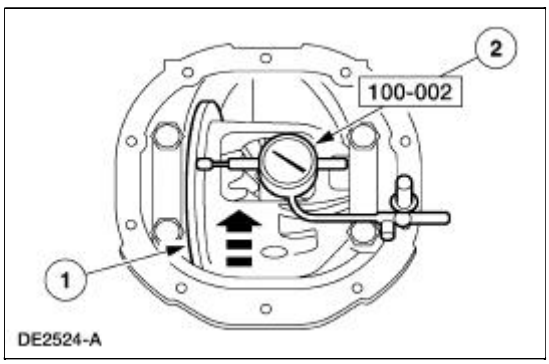
16. Using the special tool, install the new differential bearings.



17. Position the differential assembly, including the differential bearing cups and differential bearing shims, in the differential housing. Install the bearing caps and bolts.

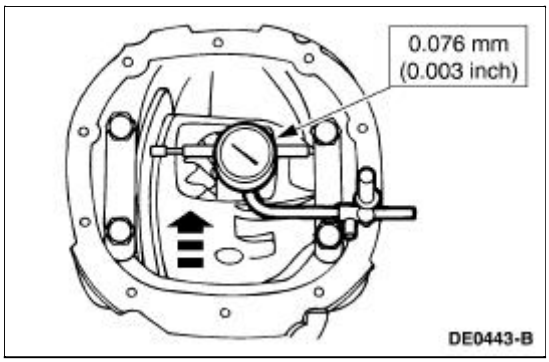


18. Position the special tool.
    1. Rotate the differential case to verify that the differential bearings have seated correctly.
    2. Position the special tool.



19. Measure the differential case runout.

- If the runout does not exceed the specification, use the new differential bearings for assembly.
- If the runout exceeds the specification, install a new differential case. For additional information, refer to Differential Case and Ring Gear in this section.

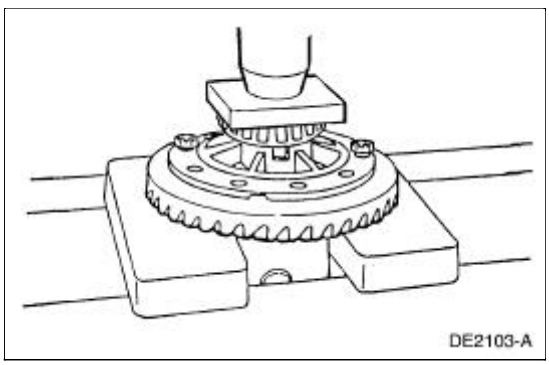


20. Remove the differential assembly from the differential housing.

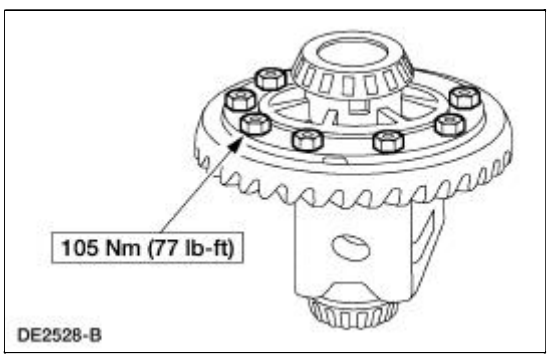
Installation

All axles

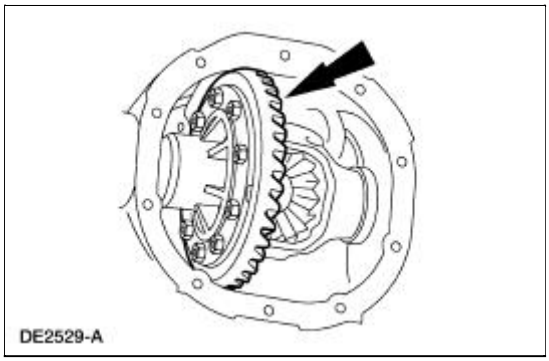
1. Position the ring gear and the differential case. Align the bolt holes by starting two bolts through the holes in the differential case and the ring gear. Press the ring gear on the differential case.



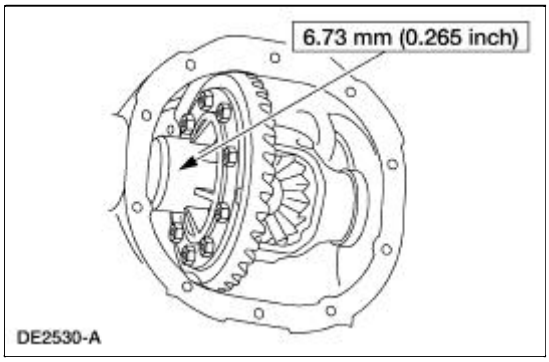
2. Install the bolts.
   - Apply Stud and Bearing Mount EOAZ-19554-BA or equivalent meeting Ford specification WSK-M2G349-A1 to the bolt threads.



3. With the pinion depth set and the pinion installed, place the differential assembly in the differential housing.



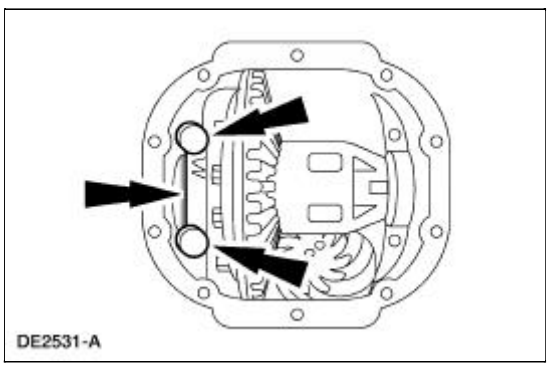
4. Install a differential bearing shim on the left side.



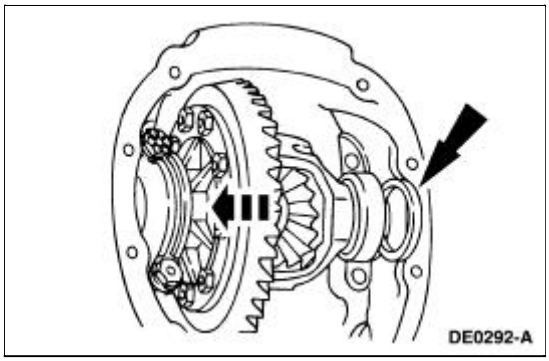
5. **CAUTION: Always install the bearing caps in their identical locations and positions.**

   NOTE: Apply pressure toward the left side to make sure the left differential bearing cup seats correctly.

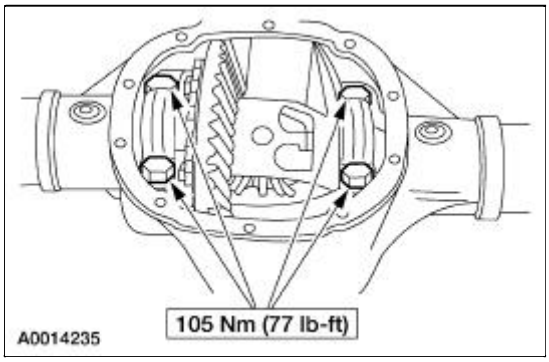
   Install the left bearing cap and loosely install the bolts.



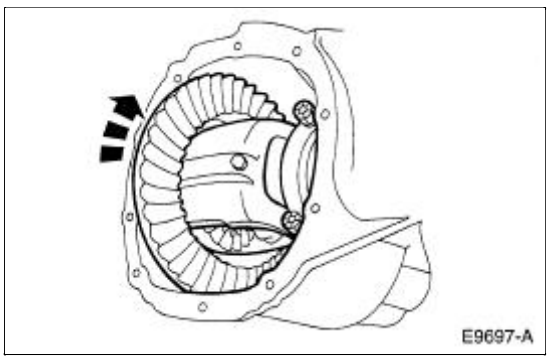
6. Install progressively larger differential bearing shims on the right side until the largest shim selected is installed by hand.



7. Install the right side bearing cap and tighten the left side and right side bolts to specification.



8. Rotate the differential assembly several times to verify that the differential bearings have seated correctly.

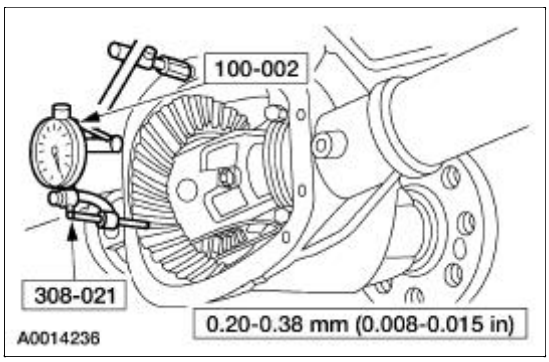


Measuring backlash

9. Using the special tools, measure the ring gear backlash.
    - If backlash is within the specification, refer to Backlash within specification in this procedure. The specification shown is the full allowable range. For the preferred range, refer to Specifications in this section.
    - If a zero backlash condition occurs, refer to Zero backlash in this procedure.
    - If backlash is not within the specification, refer to Backlash not within specification in this procedure.

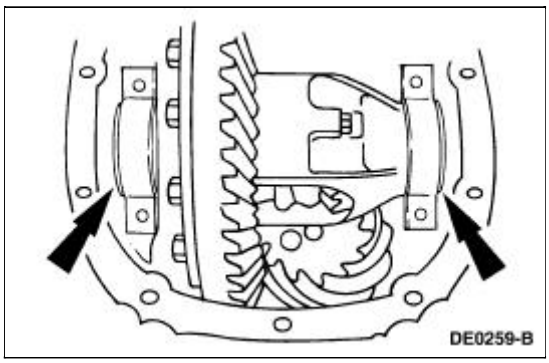
Backlash Change Required		Thickness Change Required	
mm	Inch	mm	Inch
0.025	0.001	0.050	0.002
0.050	0.002	0.050	0.002

0.076	0.003	0.101	0.004
0.101	0.004	0.152	0.006
0.127	0.005	0.152	0.006
0.152	0.006	0.203	0.008
0.177	0.007	0.254	0.010
0.203	0.008	0.254	0.010
0.228	0.009	0.304	0.012
0.254	0.010	0.355	0.014
0.279	0.011	0.355	0.014
0.304	0.012	0.406	0.016
0.330	0.013	0.457	0.018
0.335	0.014	0.457	0.018
0.381	0.015	0.508	0.020

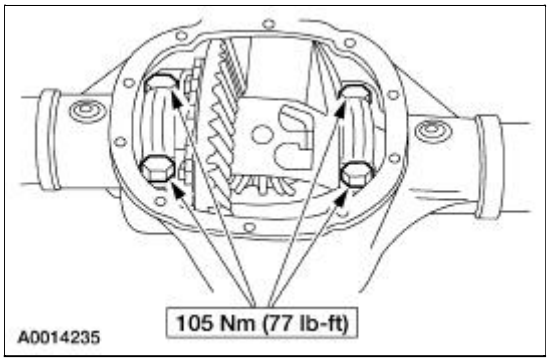


Zero backlash

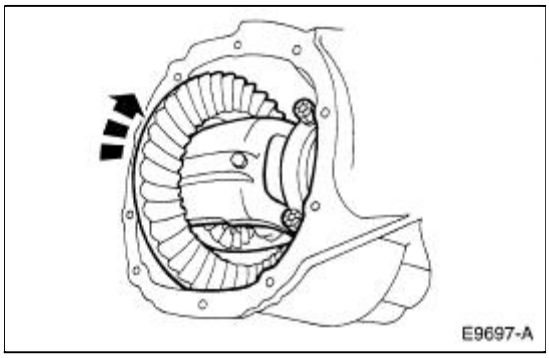
10. If a zero backlash condition occurs, remove the bearing caps and add 0.51 mm (0.020 inch) to the RH side and subtract 0.51 mm (0.020 inch) from the LH side to allow backlash indication.



11. Install the bearing caps and the bolts.



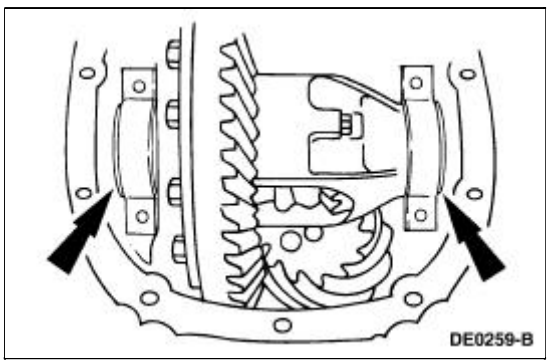
12. Rotate the differential assembly several times to verify that the differential bearings seated correctly.



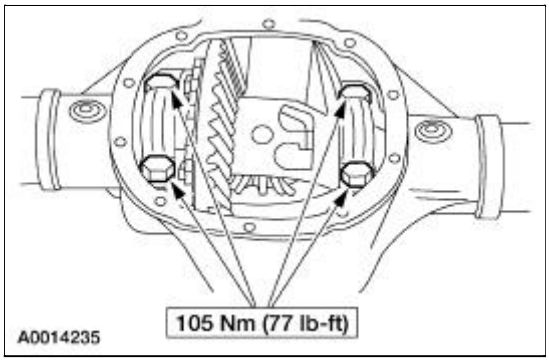
13. Measure the backlash. Refer to Measuring backlash in this procedure.

Backlash not within specification

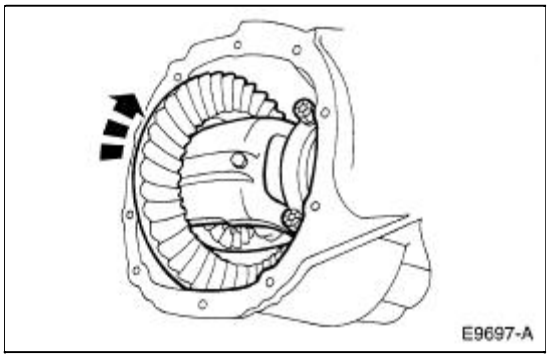
14. To increase or decrease the backlash, remove the bearing caps and install a thicker shim and thinner shim accordingly.
    - If backlash is not within the specification, increase the thickness of one differential bearing shim and decrease the thickness of the other differential bearing shim by the same amount.



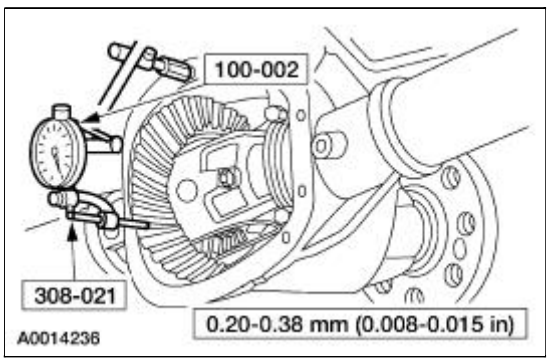
15. Install the bearing caps and the bolts.



16. Rotate the differential several times to verify that the differential bearings have seated correctly.



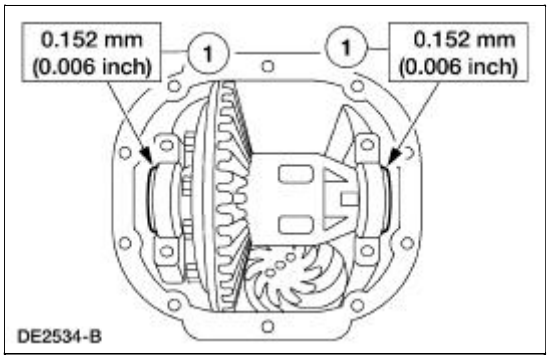
17. Using the special tools, recheck the backlash.
    - If backlash is within the specification, refer to Backlash within specification in this procedure. If backlash is not within the specification, repeat Backlash not within specification in this procedure.
    - The specification shown is the full allowable range. For the preferred range, refer to Specifications in this section.

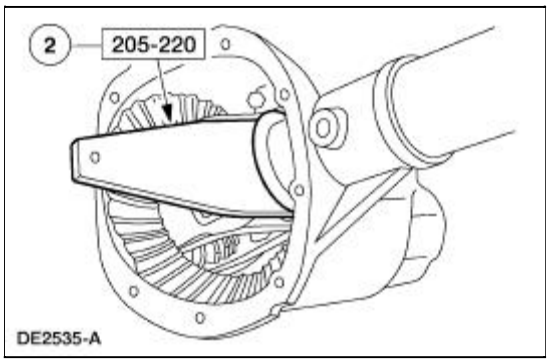


Backlash within specification

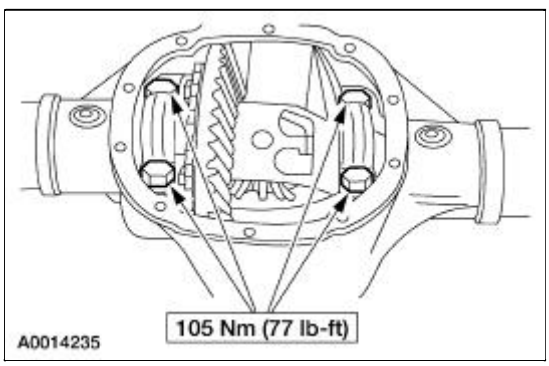
18. Remove the bolts and bearing caps.

19. Set the differential bearing preload.
    1. To establish differential bearing preload, increase both left and right differential bearing shim sizes by the specification shown.
    2. Using the special tool, fully seat the differential bearing shims. Make sure the assembly rotates freely.

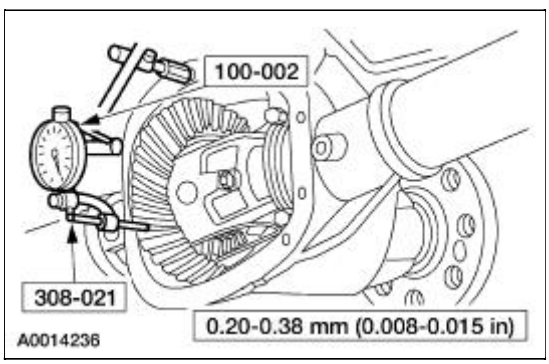




20. Install the bearing caps and bolts.



21. Using the special tools, recheck the backlash.
    - The specification shown is the full allowable range. For the preferred range, refer to Specifications in this section.



22. Install the axle shafts. For additional information, refer to Axle Shaft in this section.

23. Install the differential housing cover and refill the rear axle with specified lubricant. For additional information, refer to Differential Housing Cover in this section.

24. Lower the vehicle.

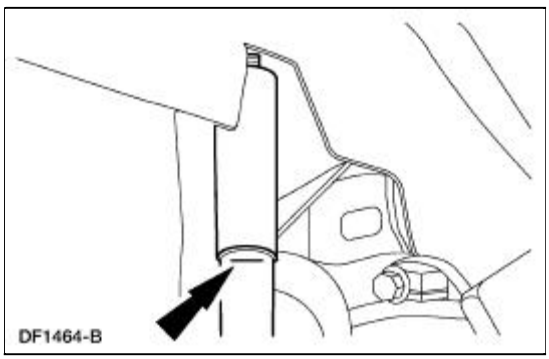
Axle Assembly

Removal and Installation

1. **CAUTION: The vehicle must be on level ground and at curb height.**

   Mark the rear shock absorbers relative to their protective sleeve.

   - During installation, raise the suspension to this reference mark before tightening the suspension fasteners.



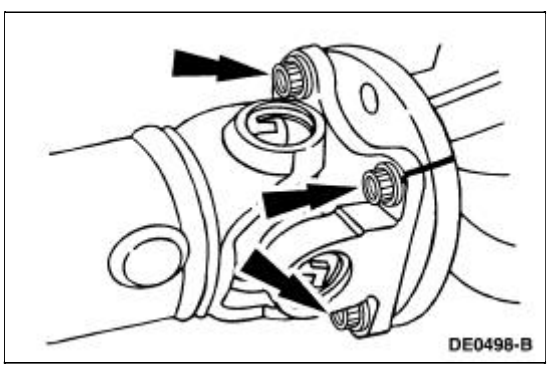
2. Raise and support the vehicle. For additional information, refer to Section 100-02 .

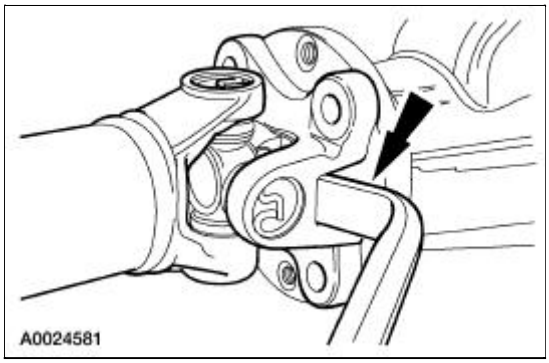
3. Remove the rear wheel and tire assemblies. For additional information, refer to Section 204-04 .

4. **CAUTION: Index-mark the driveshaft flange and pinion flange (4851) to maintain initial balance during installation.**

   CAUTION: The driveshaft centering socket yoke fits tightly on the pinion flange pilot. Never hammer on the driveshaft or any of its components to disconnect the yoke from the flange. Pry only in the area shown, with a suitable tool, to disconnect the yoke from the flange.

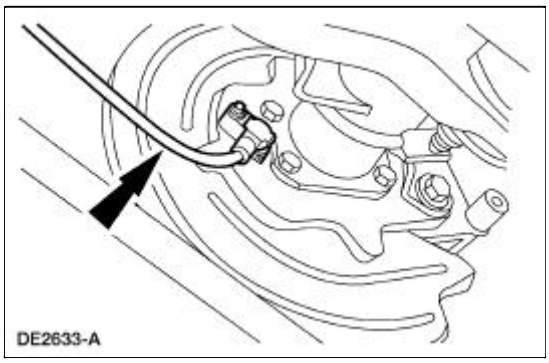
   Disconnect and position the driveshaft out of the way. For additional information, refer to Section 205-01 .





5. **NOTE:** If necessary, use Rust Penetrant and Inhibitor F2AZ-19A501-A meeting Ford specification ESR-M99C56-A to loosen the sensor for removal.

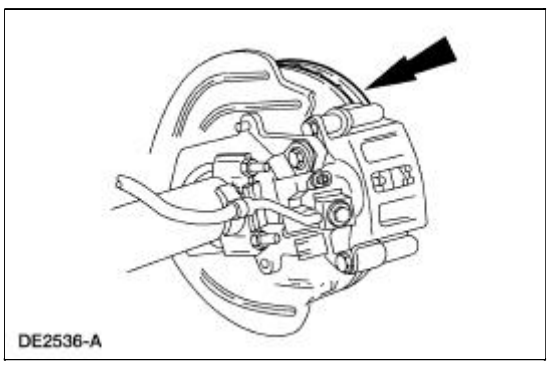
   Remove the rear anti-lock brake sensors from the rear disc brake adapters. For additional information, refer to Section 206-09A .



6. **CAUTION: Index-mark the brake discs and the wheel studs prior to brake disc removal.**

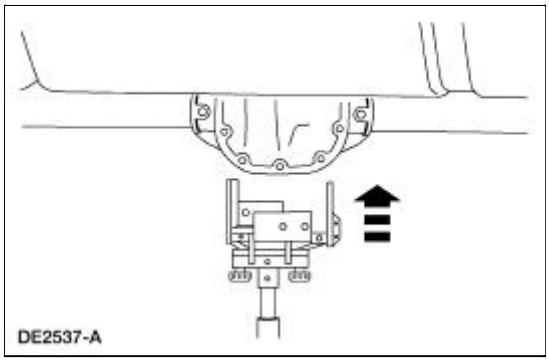
   CAUTION: Do not allow the calipers to hang from the brake hoses.

   Remove the rear brake discs. For additional information, refer to Section 206-04 .

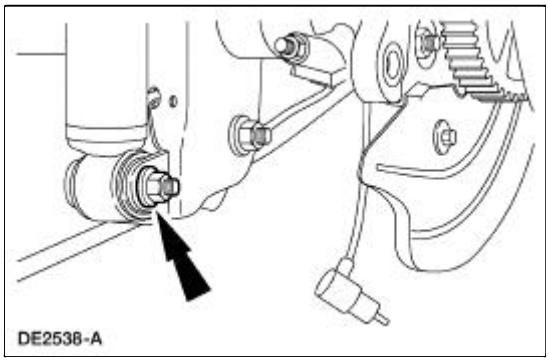


7. **CAUTION: Secure the differential housing (4010) to the jack with a suitable strap.**

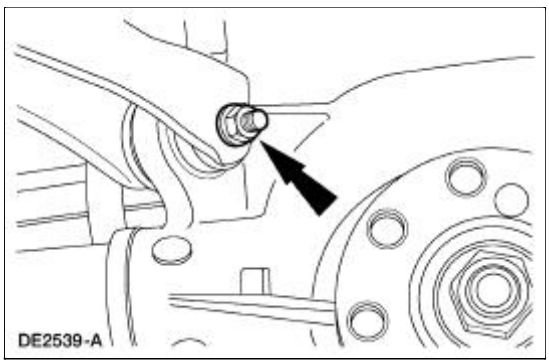
   Support the differential housing with a suitable hi-lift jack.



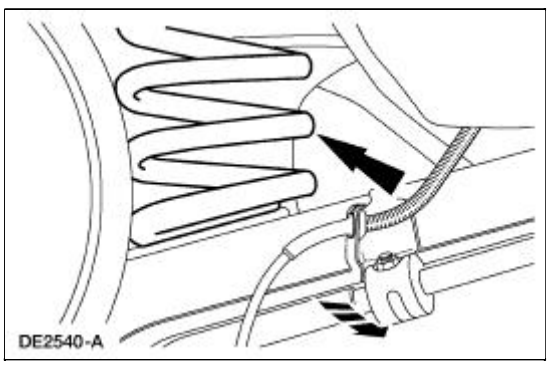
8. Remove and discard the nuts and bolts retaining the shock absorbers to the axle.



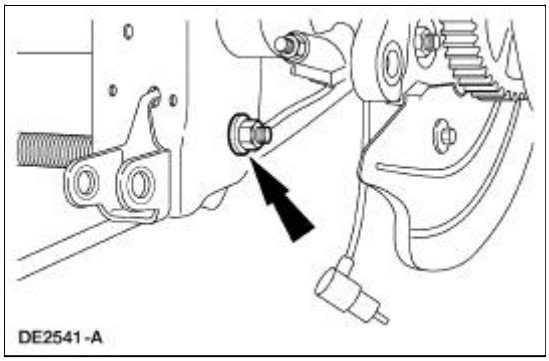
9. Remove and discard the nuts and bolts retaining the upper suspension arm and bushings to the differential housing.



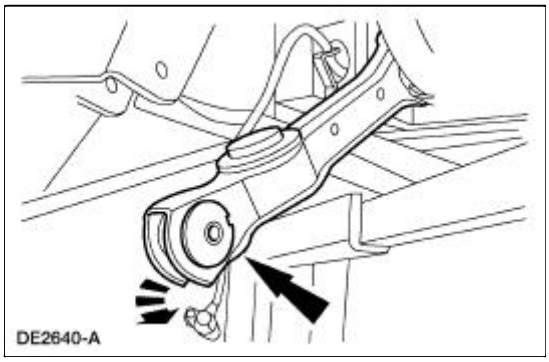
10. Lower the axle slightly, and remove the springs.



11. Remove and discard the nuts and bolts retaining the lower suspension arm and bushings to the axle.



12. Disconnect the lower suspension arm and bushings from the axle.



13. Remove the axle from the vehicle.

14. **CAUTION: Align the index marks on the driveshaft centering socket yoke and the pinion flange.**

CAUTION: Install the driveshaft with new bolts. If new bolts are not available, apply Threadlock and Sealer EOAZ-19554-AA or equivalent meeting Ford specification WSK-M2G351-A5 to the threads of the original bolts.

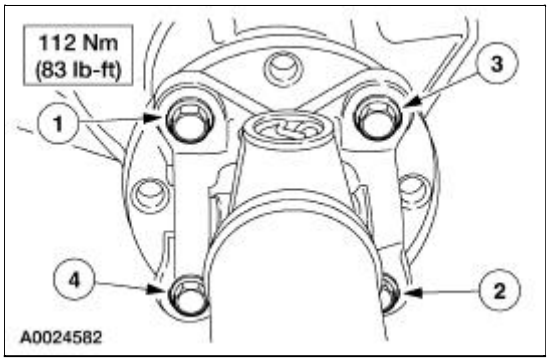
CAUTION: The driveshaft centering socket yoke fits tightly on the pinion flange pilot. To make sure that the yoke seats squarely on the flange, tighten the bolts evenly in a cross pattern as shown.

CAUTION: Raise the suspension to the reference marks on the rear shock absorbers before tightening the suspension fasteners.

NOTE: Apply High Temperature Nickel Anti-Sieze Lubricant F6AZ-9L494-AA meeting Ford specification ESE-M124A-A to the rear anti-lock brake sensor body where it will make contact when installed.

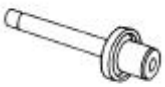
To install, reverse the removal procedure.

- Refer to Section 204-02 for rear suspension fastener tightening specifications.
- Refer to Section 204-04 for wheel nut tightening specification.
- Check and, if necessary, fill the axle with the specified lubricant to the specified level. For additional information, refer to Specifications in this section.


112 Nm
(83 lb-ft)
1
2
3
4
A0024582

Differential Case and Ring Gear

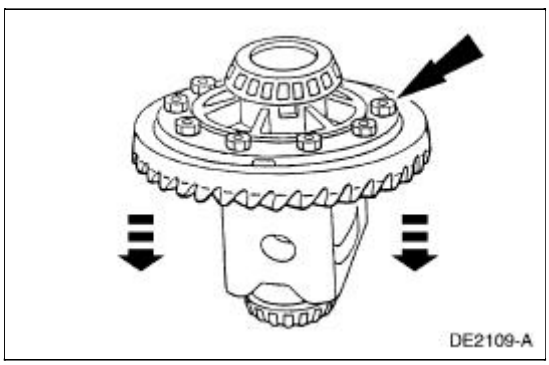
Special Tool(s)

ST2026-A	2-Jaw Puller 205-D072 (D97L-4221-A) or equivalent
 ST1375-A	Installer, Differential Side Bearing 205-009 (T57L-4221-A1)
ST1543-A	Step Plate 205-D016 (D80L-630-5) or equivalent

Disassembly

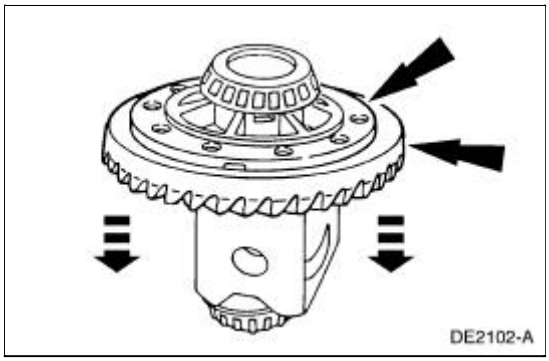
1. Remove the differential assembly from the differential housing. For additional information, refer to Differential Case in this section.

2. Remove the bolts.

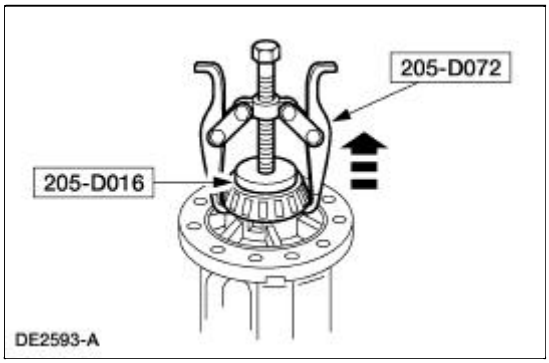

DE2109-A

3. **CAUTION: Do not damage the threads in the bolt holes.**

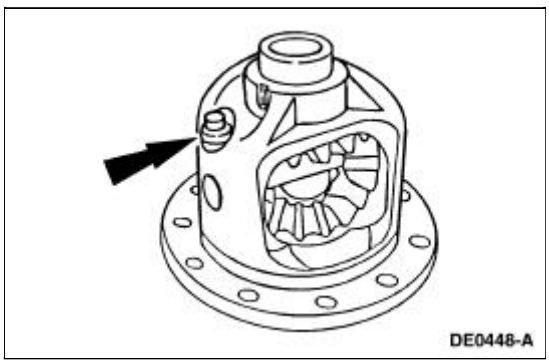
   Insert a punch in the bolt holes and drive off the ring gear.



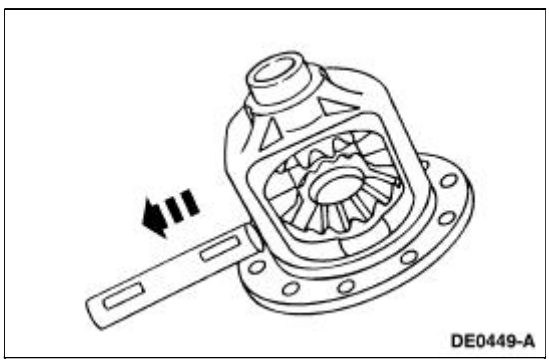
4. Using the special tools, remove the differential bearings (4221), if necessary.



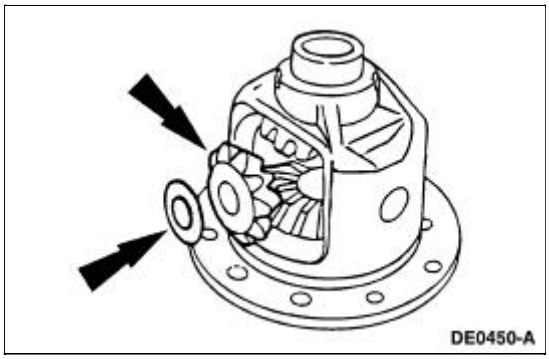
5. Remove the bolt.



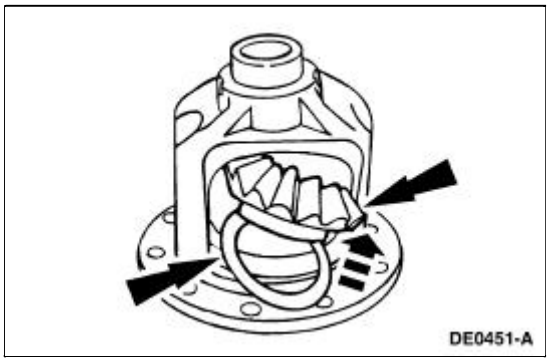
6. Remove the differential pinion shaft (4211).



7. Rotate and remove the differential pinion gears (4215) and differential pinion thrust washers (4230).

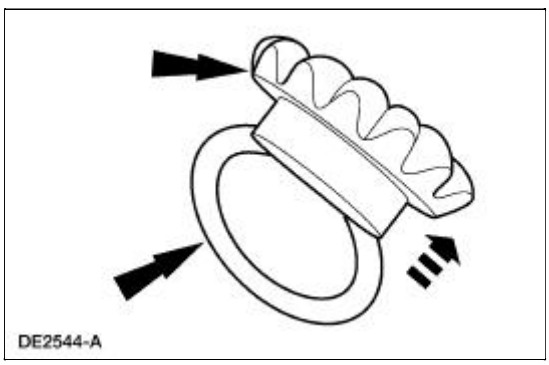


8. Remove the differential side gears (4236) and the differential side gear thrust washers (4228).

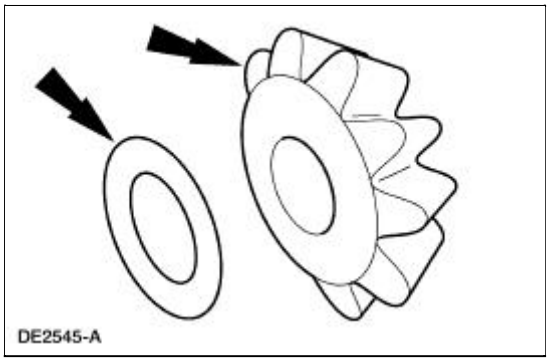


Assembly

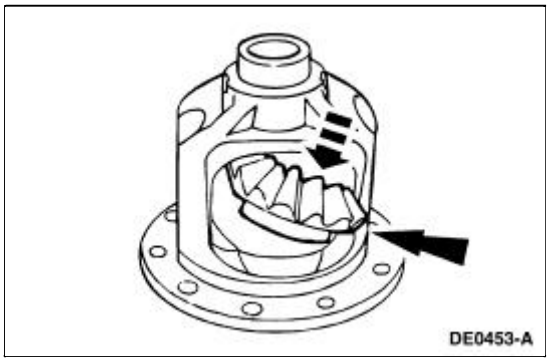
1. Lubricate the differential side gear thrust washers and the differential side gear journals, and assemble the washers to the gears.
    - Use SAE 80W-90 Premium Rear Axle Lubricant XY-80W90-QL or equivalent meeting Ford specification WSP-M2C197-A.



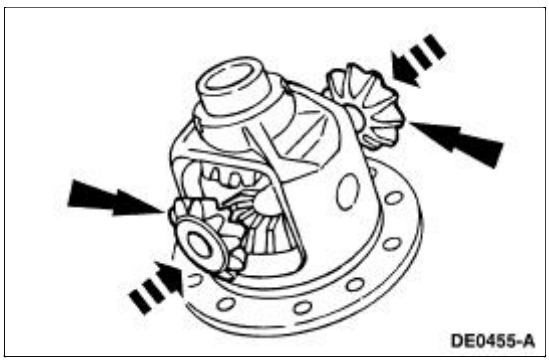
2. Lubricate the differential pinion thrust washers and the differential pinion gears, and assemble the washers to the gears.
    - Use SAE 80W-90 Premium Rear Axle Lubricant XY-80W90-QL or equivalent meeting Ford specification WSP-M2C197-A.



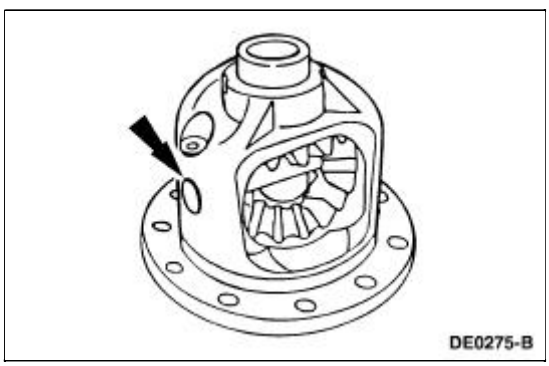
3. Position the differential side gear and thrust washer assemblies in the differential case.



4. Engage the differential pinion gears with the differential side gears and rotate the pinion gears to align with the differential pinion shaft bore.



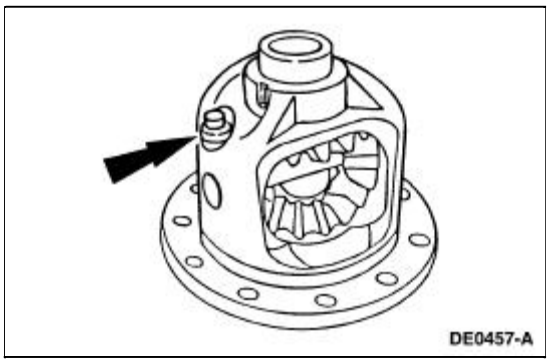
5. Insert the differential pinion shaft.
    - Align the hole in the differential pinion shaft with the hole in the differential case.



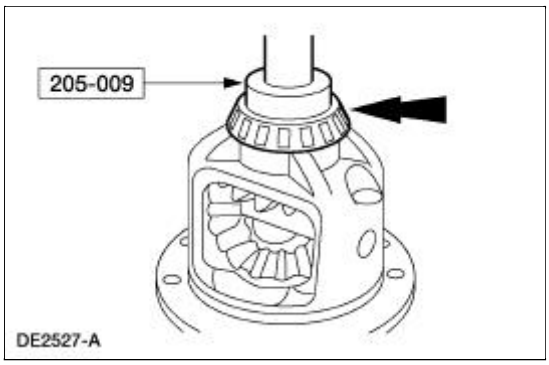
6. **NOTE:** If a new bolt is unavailable, coat the original bolt threads with Threadlock and Sealer EOAZ-19554-AA or equivalent meeting Ford specifications WSK-M2G351-A5 prior to

installation.

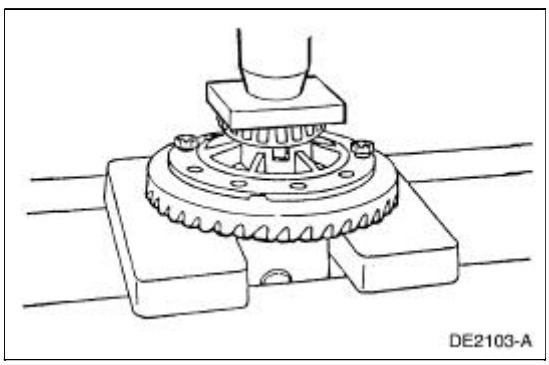
Install a new bolt finger-tight.



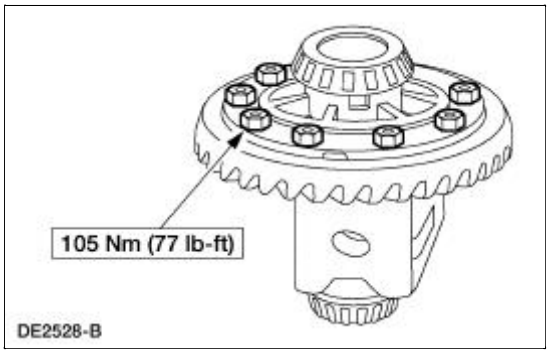
7. Using the special tool, install the new differential bearings, if removed.



8. Position the ring gear and the differential case. Align the bolt holes by starting two bolts through the holes in the differential case and the ring gear. Press the ring gear on the differential case.



9. Install the bolts.
    - Apply Stud and Bearing Mount EOAZ-19554-BA or equivalent meeting Ford specification WSK-M2G349-A1 to the bolt threads.



10. Install the differential case. For additional information, refer to Differential Case in this section.

General Specifications

Item	Specification
Lubes and Sealers	
SAE 75W-140 High Performance Rear Axle Lubricant F1TZ-19580-B	WSL-M2C192-A
Premium Long-Life Grease XG-1-C	ESA-M1C75-B
Rust Penetrant and Inhibitor F2AZ-19A501-A	ESR-M99C56-A
High Temperature Nickel Anti-Sieze Lubricant F6AZ-9L494-AA	ESE-M124A-A
Additive Friction Modifier C8AZ-19B546-A	EST-M2C118-A
Clear Silicone Rubber D6AZ-19562-AA	ESB-M4G92-A
Threadlock and Sealer EOAZ-19554-AA	WSK-M2G351-A5
Lubricant Fill Level Checks	
Additive Friction Modifier	118 ml (4 oz)
Approximate axle fill capacity [a] [b]	1.66-1.77-liters (3.5-3.75-pints) 6.4-14.3-mm (1/4-9/16-in) below the bottom of the fill hole
Clearance, Tolerance and Adjustments	
Maximum ring gear back face runout	0.102 mm (0.004 in)
Maximum differential case runout	0.076 mm (0.003 in)
Differential side gear thrust washer thickness	0.762 mm - 0.813 mm (0.030 in - 0.032 in)
Differential pinion gear thrust washer thickness	0.762 mm -0.813 mm (0.030 in - 0.032 in)
Maximum axle shaft end play	0.762 mm (0.030 in)
Ring gear backlash	0.203 mm - 0.381 mm (0.305 mm - 0.381 mm preferred) 0.008 in - 0.015 in (0.012 in - 0.015 in preferred)
Variation between teeth maximum backlash	0.102 mm (0.004 in)
Pinion flange runout	0.25 mm (0.010 in) T.I.R.

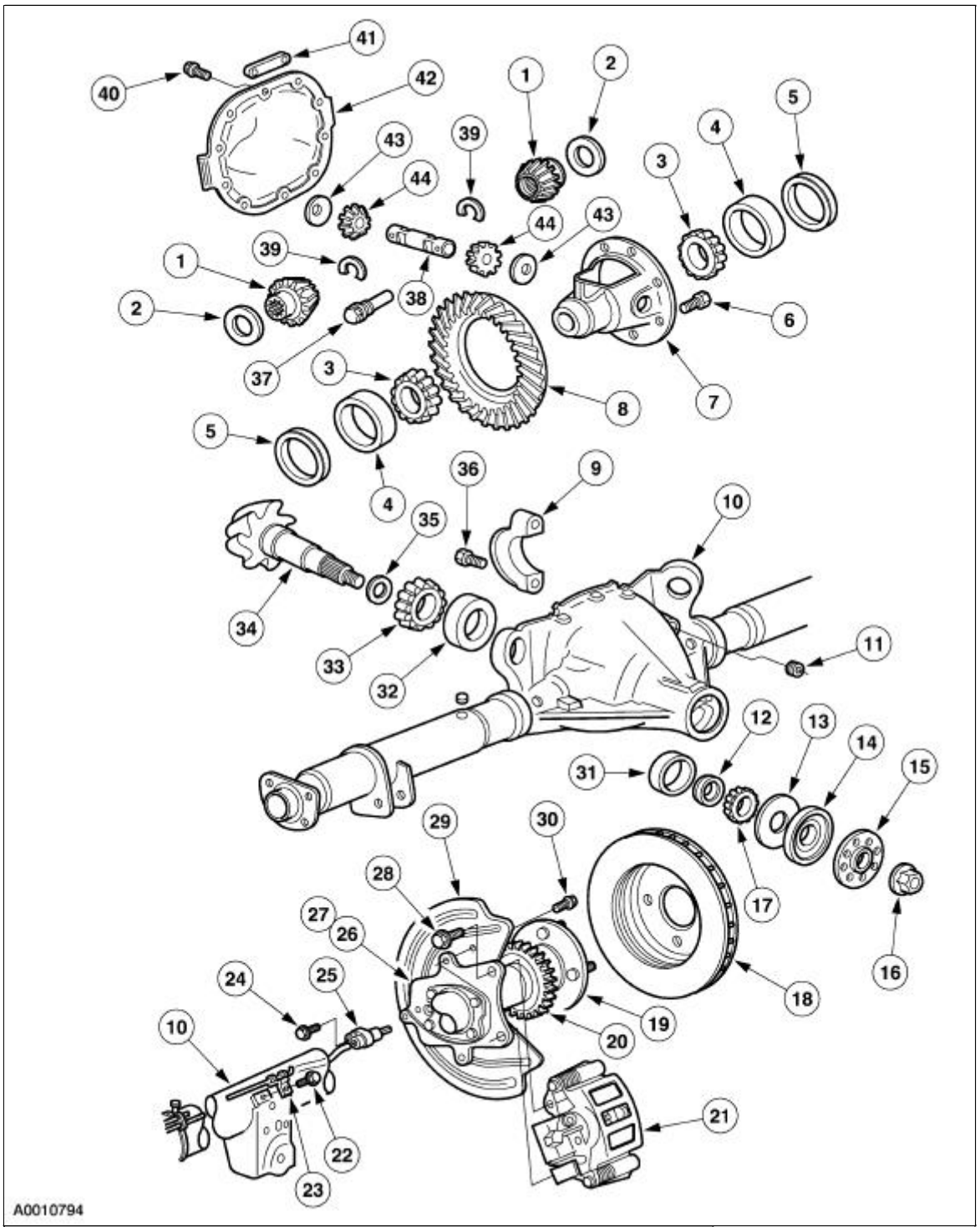
[a] If it is necessary to refill a Traction-Lok® axle with new lubricant, add 118 ml (4 oz) of Additive Friction Modifier C8AZ-19B546-A or equivalent meeting Ford specification EST-M2C118-A before filling the axle with the new lubricant.
[b] In-vehicle repair refill capacities are determined by filling the rear axle with the specified lubricant to 6.4-14.3-mm (1/4-9/16-in) below the bottom of the fill hole.

Torque Specifications

Description	Nm	lb-ft	lb-in
Bolt retaining the differential pinion shaft to the differential case	30	22	—
Bolt retaining the driveshaft yoke to the pinion flange	112	83	—
Bolt retaining the differential housing cover to the differential housing	44	32	—

Oil filler plug	30	22	—
Pinion bearing preload (used pinion bearings)	0.9-1.5	—	8-14
Pinion bearing preload (new pinion bearings)	1.8-3.3	—	16-29
Adapter for 205-S127	2.2	—	20
Bolt retaining the bearing cap to the differential case	105	77	—
Bolt retaining the ring gear to the differential case	105	77	—

Rear Drive Axle and Differential



Item	Part Number	Description
1	4236	Differential side gear
2	4228	Differential side gear thrust washer
3	4221	Differential bearing

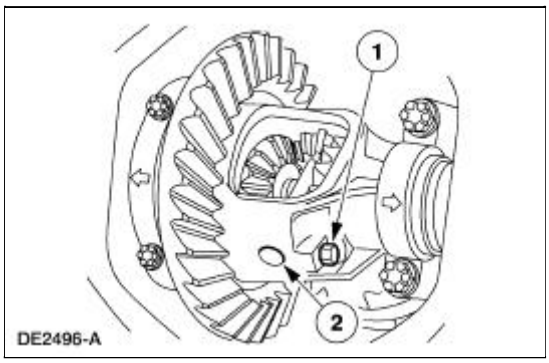
4	4222	Differential bearing cup
5	4067	Differential bearing shim
6	4216	Rear axle differential gear case bolt
7	4204	Differential case
8	—	Ring gear (part of 4209 gearset)
9	—	Bearing cap (part of 4010)
10	4010	Rear axle housing
11	373098-S	Filler plug
12	4662	Collapsible spacer
13	4670	Rear axle drive pinion shaft oil slinger
14	4676	Rear axle drive pinion seal
15	4851	Pinion flange
16	389546-S100	Pinion nut
17	4621	Differential pinion bearing
18	2C026	Rear brake disc
19	—	Axle shaft flange (part of 4234)
20	2C189	Rear brake anti-lock sensor indicator
21	2552	Rear disc brake caliper
22	N601951-S2	Bolt
23	N804361-S100	Clip
24	—	Bolt (part of 4010)
25	2C190	Rear brake anti-lock sensor
26	2C101	Left hand rear disc brake adapter
27	2C100	Right hand rear disc brake adapter
28	N8015163-S190	Caliper anchor bolt
29	2C028	Rear wheel brake disc shield
30	N602726-S2	Bolt (3 req'd)
31	4616	Differential drive pinion bearing cup
32	4628	Rear axle pinion bearing cup
33	4630	Differential pinion bearing
34	—	Drive pinion gear (part of 4209 gearset)
35	4663	Drive pinion bearing adjustment shim
36	—	Bolt (part of 4010)
37	4241	Differential pinion shaft lock bolt
38	4211	Differential pinion shaft
39	4N237	U-washer
40	383548	Bolt
41	—	Rear axle identification tag (part of 4001)
42	4033	Differential housing cover
43	4230	Differential pinion thrust washer
44	4215	Differential pinion gear

- The axle housing assembly consists of a cast center section with two steel tube assemblies and a stamped differential housing cover (4033). The differential housing cover uses silicone sealant as a gasket.
- The hypoid-design gearset consists of 8.8-inch ring gear (4209) and a drive pinion gear (4209). Two opposed tapered roller bearings support the drive pinion in the axle housing (4010).
- A collapsible spacer (4662), located on the differential pinion shaft, maintains pinion bearing preload. The pinion nut (389546-S100) adjusts the preload.
- Differential bearing shims (4067), located between the differential bearing cups (4222) and the rear axle housing, adjust the differential bearing preload and the ring gear backlash.
- The differential case (4204) is a one-piece design with two openings to allow for assembly of the internal components and lubricant flow. Two opposed tapered roller bearings (differential bearings) (4221) support the differential case in the axle housing. Removable bearing caps (4010) retain the differential assembly in the axle housing.
- Inside the differential case, the differential pinion shaft (4211) supports two differential pinion gears (4215). The pinion gears engage the differential side gears (4236), to which the axle shafts (4234) are splined. The differential pinion shaft lock bolt (4241) retains the differential pinion shaft in the differential case.
- An embossed metal tag, bolted to the differential housing cover, contains rear axle identification.

Axle Shaft

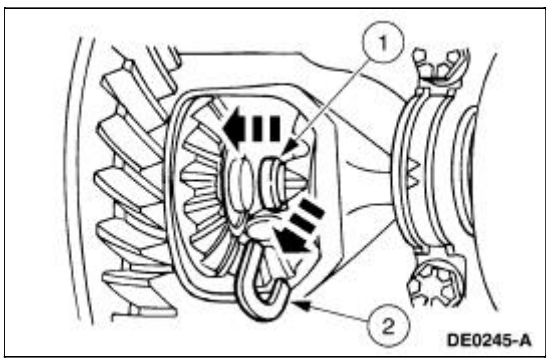
Removal

1. Raise and support the vehicle. For additional information, refer to Section 100-02 .
2. Remove the wheel and tire assembly. For additional information, refer to Section 204-04 .
3. Remove the rear brake disc (2C026). For additional information, refer to Section 206-04 .
4. Remove the differential housing cover (4033) and drain the lubricant. For additional information, refer to Differential Housing Cover in this section.
5. Remove the differential pinion shaft (4211).
    1. Remove the differential pinion shaft lock bolt (4241).
    2. Remove the differential pinion shaft.



6. **CAUTION: Do not damage the rubber O-ring in the axle shaft groove.**

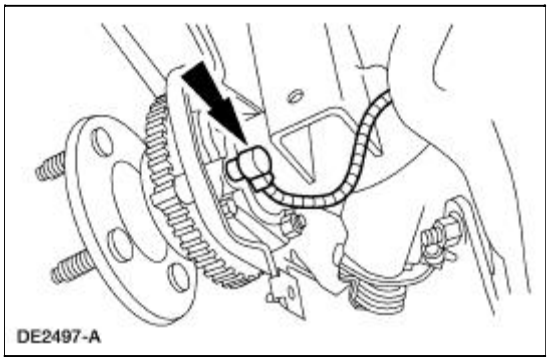
    Remove the U-washer (4N237).
    1. Push the axle shafts (4234) inboard.
    2. Remove the U-washer.



7. **CAUTION: Damage to the rear brake anti-lock sensor (2C190) may occur if it is not removed before the axle shaft.**

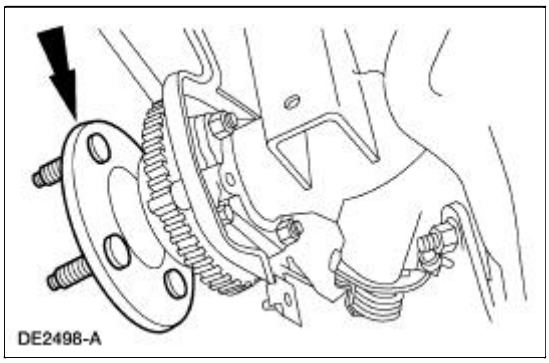
    Carefully remove the rear brake anti-lock sensor. For additional information, refer to Section

206-09A .



8. **CAUTION: Do not damage the wheel bearing oil seal.**

   Remove the axle shaft.

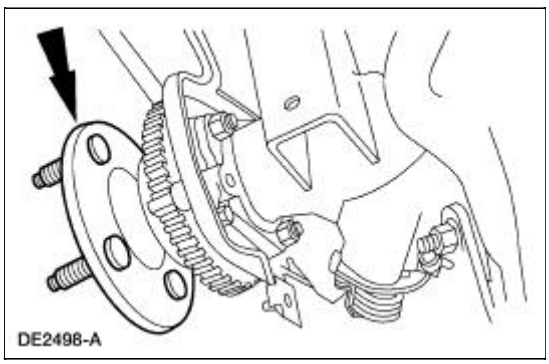


Installation

1. Lubricate the lip of the wheel bearing oil seal
   - Use Premium Long-Life Grease XG-1-C or equivalent meeting Ford specification ESA-M1C75-B.

2. **CAUTION: Do not damage the wheel bearing oil seal.**

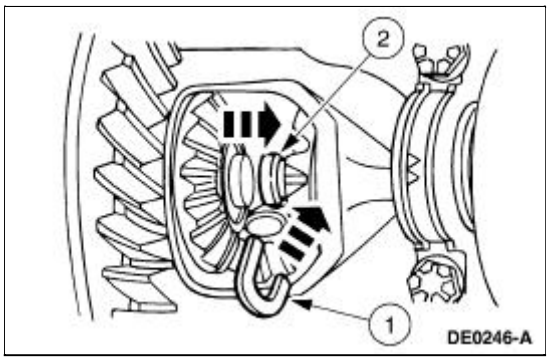
   Install the two axle shafts.



3. **CAUTION: Do not damage the rubber O-ring in the axle shaft groove.**

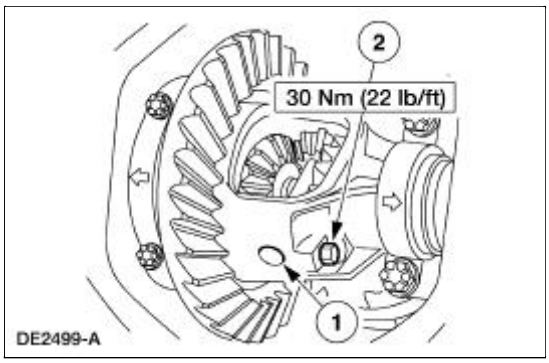
   Install the U-washer.

1. Position the two U-washers on the button end of the axle shaft.
2. Pull the axle shaft outward.



4. **NOTE:** If a new pinion shaft lock bolt is unavailable, coat the threads with Threadlock and Sealer EOAZ-19554-AA or equivalent meeting Ford specification WSK-M2G351-A5 prior to installation.

   Install the differential pinion shaft.
   1. Align the hole in the differential pinion shaft with the case lock bolt hole.
   2. Install a new differential pinion shaft lock bolt.



5. Install the differential housing cover and fill the rear axle with the specified lubrication. For additional information, refer to Differential Housing Cover in this section.

6. Install the rear brake anti-lock sensor. For additional information, refer to Section 206-09A .

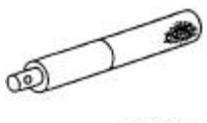
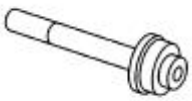
7. Install the rear brakes. For additional information, refer to Section 206-04 .

8. Install the tire and wheel assembly. For additional information, refer to Section 204-04 .

9. Lower the vehicle.

Rear Wheel Bearing and Axle Shaft Oil Seal

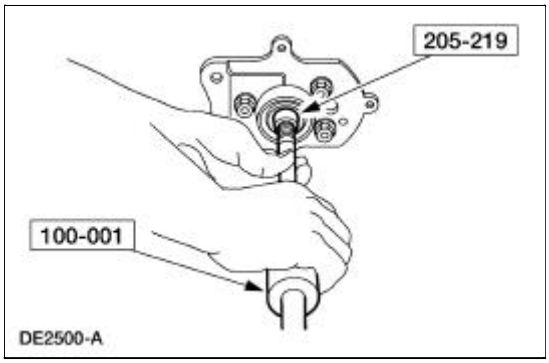
Special Tool(s)

 ST1326-A	Adapter for 303-224 205-153 (T80T-4000-W)
 ST1514-A	Installer, Axle Shaft Bearing 205-124 (T78P-1225-A)
ST2027-A	Installer, Rear Axle Oil Seal 205-390 (T97T-1177-B)
ST2035-A	Remover, Axle Bearing 205-219 (T85L-1225-AH)
ST1185-A	Slide Hammer 100-001 (T50T-100-A)

Removal

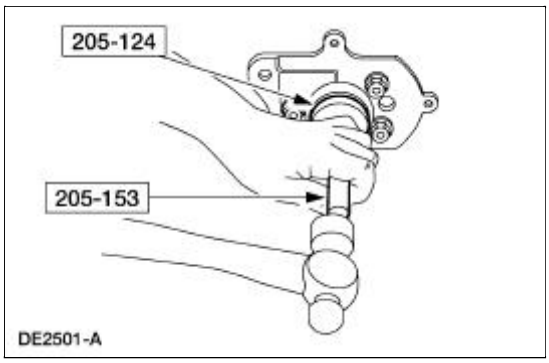
1. Remove the axle shaft (4234). For additional information, refer to Axle Shaft in this section.
2. **NOTE:** If the wheel bearing oil seal is leaking, the axle housing vent may be plugged.

   Using the special tools, remove the rear wheel bearing and wheel bearing oil seal.

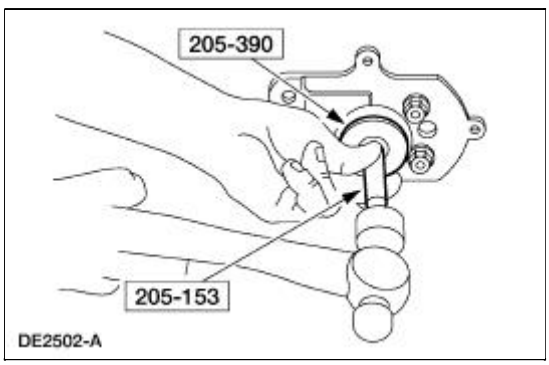


Installation

1. Lubricate the new rear wheel bearing with the specified lubricant.
2. Using the special tools, install the new rear wheel bearing.



3. Lubricate the lip of the new wheel bearing oil seal.
   - Use Premium Long-Life Grease XG-1-C or equivalent meeting Ford specification ESA-M1C75-B.
4. Using the special tools, install the new wheel bearing oil seal.



5. Install the axle shaft. For additional information, refer to Axle Shaft in this section.

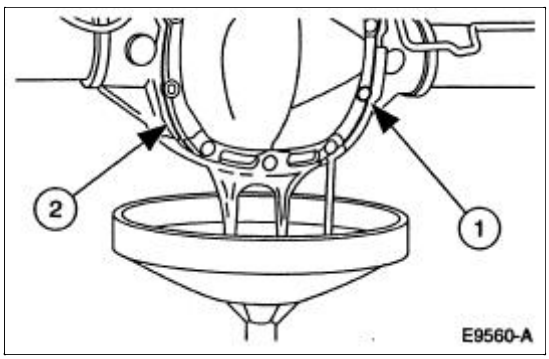
Differential Housing Cover

Removal

1. Raise and support the vehicle. For additional information, refer to Section 100-02 .

2. **NOTE:** Empty the lubricant into a clean container for reuse.

   Remove the differential housing cover (4033).
   1. Remove the 10 bolts and drain the lubricant from the differential housing (4010).
   2. Remove the differential housing cover.



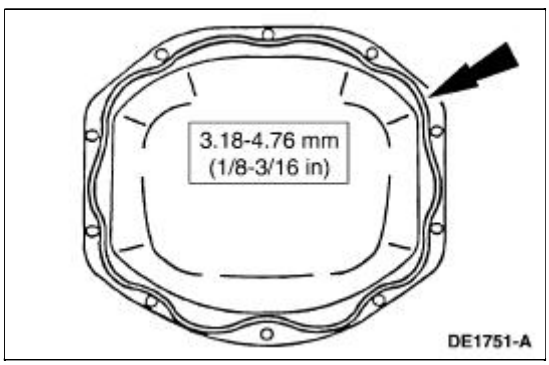
Installation

1. **CAUTION: Make sure the machined surfaces on both the differential housing and the differential housing cover are clean and free of oil before applying the new silicone sealant. To prevent contamination, cover the inside of the rear axle (4001) prior to cleaning the machined surface.**

   Clean the differential housing and the differential housing cover gasket mating surfaces.

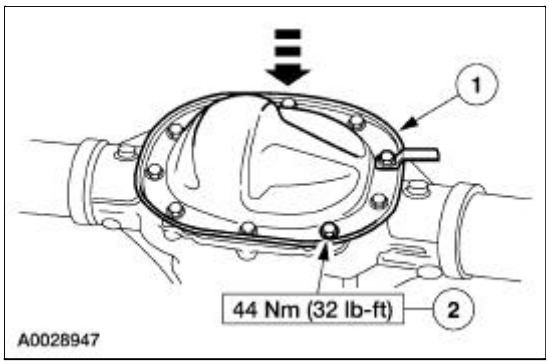
2. **CAUTION: Install the differential housing cover within 15 minutes of applying the silicone, or it will be necessary to remove and reapply new sealant.**

   Apply a continuous bead of sealant of the specified thickness to the differential housing cover.
   - Use Clear Silicone Rubber D6AZ-19562-AA or equivalent meeting Ford specifications ESB-M4G92-A.



3. **NOTE:** If possible, allow one hour before filling the axle with lubricant to make sure the silicone sealant has cured.

   Install the differential housing cover.
   1. Install the differential housing cover.
   2. Install the 10 bolts.

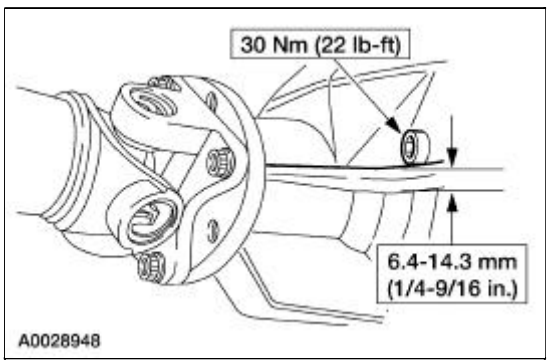


4. **NOTE:** If it is necessary to refill a Traction-Lok® axle with new lubricant, add 118 ml (4 oz) of Additive Friction Modifier C8AZ-19B546-A or equivalent meeting Ford specification EST-M2C118-A before filling the axle with the new lubricant.

   NOTE: In-vehicle repair refill capacities are determined by filling the rear axle with the specified lubricant to 6.4-14.3-mm (1/4-9/16-in) below the bottom of the fill hole.

   Fill the rear axle to the level shown, approximately 1.66-1.77-liters (3.5-3.75-pints) of lubricant, and install the filler plug.

   - Use SAE 75W-140 High Performance Rear Axle Lubricant F1TZ-19580-B or equivalent meeting Ford specification WSL-M2C192-A.



5. Lower the vehicle.

Axle Housing Bushing

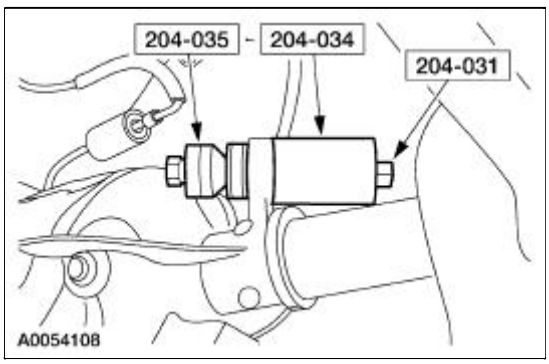
Special Tool(s)

ST2304-A	Axle Suspension Bushing Set 204-S030 (T78P-5638-A)

Removal

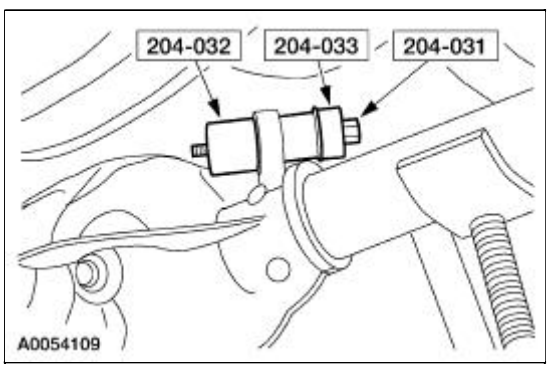
CAUTION: Suspension fasteners are critical parts because they affect performance of vital components and systems and their failure can result in major service expense. A new part with the same part number must be installed if installation becomes necessary. If substitution is necessary, the part must be of the same finish and property class. Torque values must be used as specified during reassembly to make sure of correct retention of these parts.

1. Remove the upper arm and bushing (5500). For additional information, refer to Section 204-02 .
2. Using the special tools, remove the bushing.

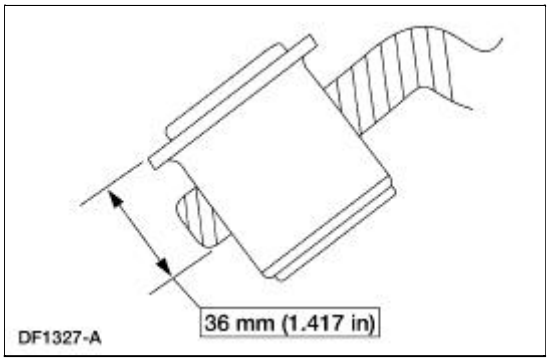


Installation

1. Using the special tools, install the bushing.



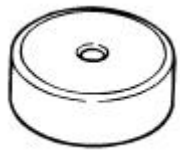
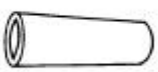
2. Using a suitable calibrated micrometer, measure the bushing as shown. If not within specifications, adjust as necessary.

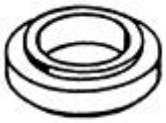
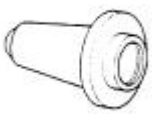


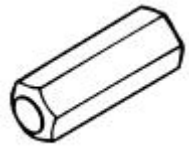
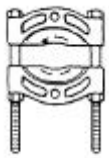
3. Install the upper arm and bushing. For additional information, refer to Section 204-02 .

Drive Pinion

Special Tool(s)

ST1743-A	Adapter for 205-S127 205-105 (T76P-4020-A3)
ST1429-A	Adapter for 205-S127 205-109 (T76P-4020-A9)
ST1431-A	Adapter for 205-S127 205-110 (T76P-4020-A10)
ST1432-A	Adapter for 205-S127 205-111 (T76P-4020-A11)
 ST1743-A	Adapter for 205-S127 205-129 (T79P-4020-A18)
 ST1434-A	Adapter for 205-S127 205-130 (T79P-4020-A19) or equivalent
ST1326-A	Adapter for 303-224 (Short Handle) 205-153 (T80T-4000-W)
	Handle 205-D055 (D81L-4000-A) or

ST1653-A	equivalent
ST1257-A	Holding Fixture, Drive Pinion Flange 205-126 (T78P-4851-A)
 ST1367-A	Installer, Drive Pinion Bearing Cone 205-005 (T53T-4621-C)
ST1678-A	Installer, Drive Pinion Bearing Cup 205-024 (T67P-4616-A)
ST1860-A	Installer, Drive Pinion Bearing (Outer) 205-231 (T85T-4616-AH)
ST1862-A	Installer, Drive Pinion Flange 205-002 (TOOL-4858-E) or equivalent
 ST1325-A	Installer, Drive Pinion Oil Seal 205-133 (T79P-4676-A)
ST1254-A	Plate, Bearing/Oil Seal 205-090 (T75L-1165-B)
	Protector, Drive Pinion Thread 205-460

 ST1744-A	
 ST1368-A	Puller, Bearing 205-D064 (D84L-1123-A) or equivalent

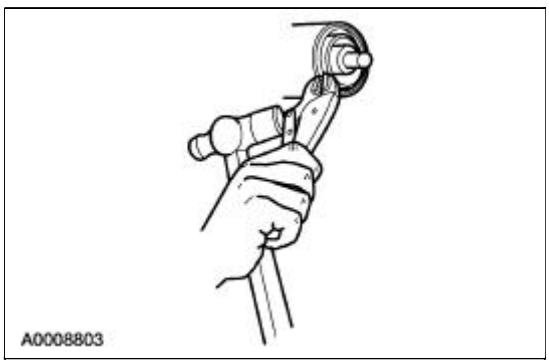
Removal

1. Remove the differential assembly from the differential housing. For additional information, refer to Differential Case in this section.

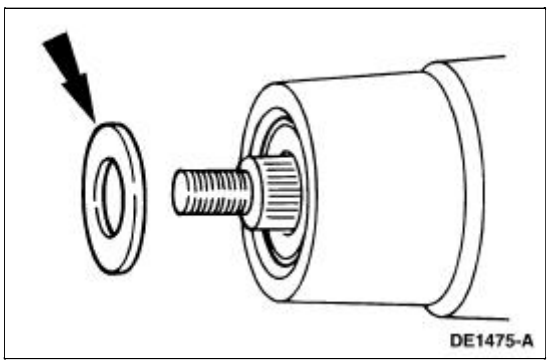
2. **CAUTION: Record the torque necessary to maintain rotation of the drive pinion gear through several revolutions prior to removing the pinion flange (4851).**

   Remove the pinion flange. For additional information, refer to Drive Pinion Flange and Drive Pinion Seal in this section.

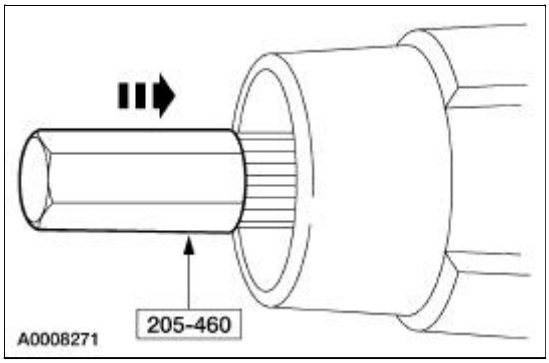
3. Force the rear axle drive pinion seal metal flange up. Install gripping pliers and strike with a hammer to remove the seal.



4. Remove the rear axle drive pinion shaft oil slinger (4670).

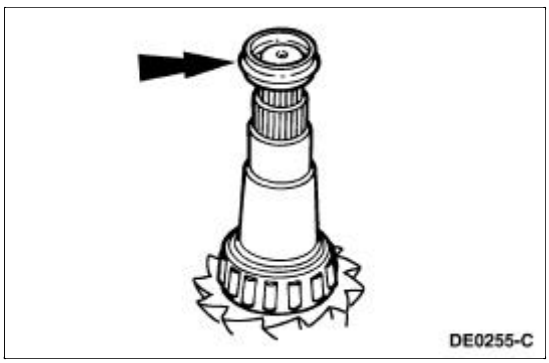


5. Using the special tool and a soft-faced hammer, drive the pinion assembly out of the outer differential pinion bearing (4621) and remove the drive pinion through the rear of the differential housing (4010).

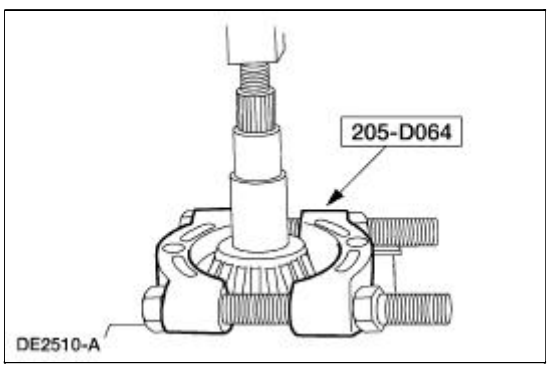


6. Remove the outer differential pinion bearing.

7. Remove and discard the collapsible spacer (4662).

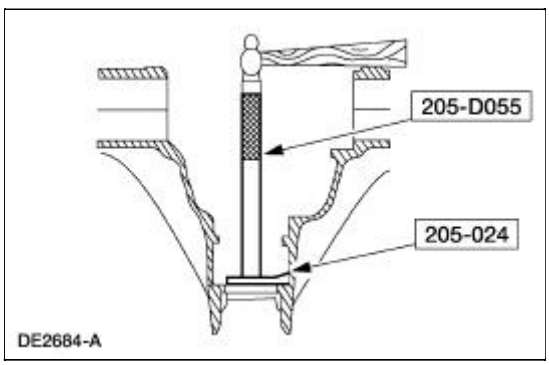


8. Using the special tool and a suitable press, remove the inner differential pinion bearing (4630).

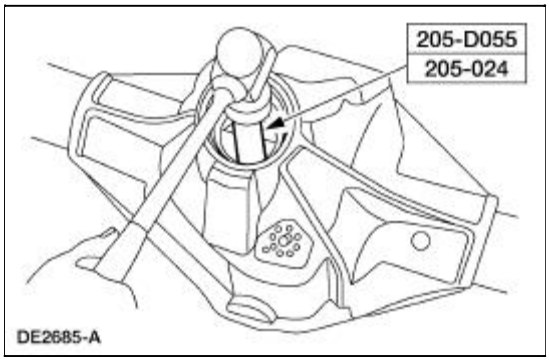


9. **NOTE:** Do not remove the pinion bearing cups from the differential housing unless the cups are damaged.

   Using the special tools, remove the outer differential drive pinion bearing cup (4616).



10. Using the special tools, remove the inner rear axle pinion bearing cup (4628).

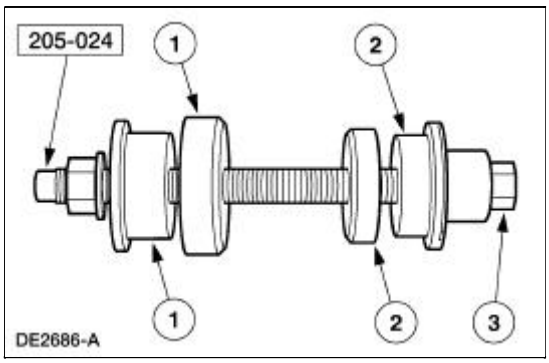


Installation

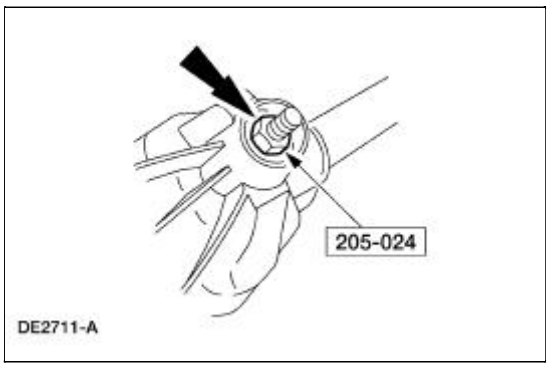
Using special tool 205-024

NOTE: This is the preferred method for installing the pinion bearing cups. If necessary, proceed to Using special tools 205-153, 205-024, 205-231, and 205-D055 in this procedure for an alternate method.

1. Position the special tools and the inner and outer pinion bearing cups in their respective bores.
    1. After placing the inner and outer bearing cups in their bores, place the special tool on the inner bearing cup.
    2. Place the special tool on the outer bearing cup.
    3. Install the special tool.



2. Tighten the special tool to seat the pinion bearing cups in their bores.

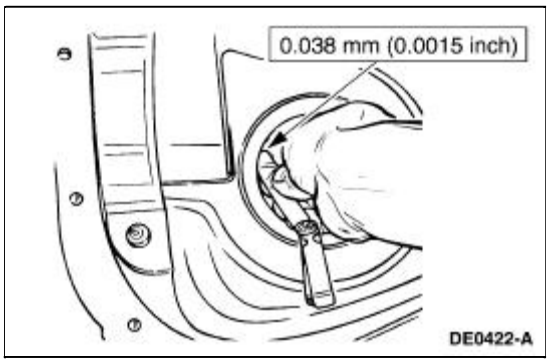


3. **CAUTION: Always install new differential pinion bearings when installing new pinion bearing cups.**

    NOTE: If the feeler gauge can fit between a cup and the bottom of its bore at any point around

the cup, remove and reseat the cup.

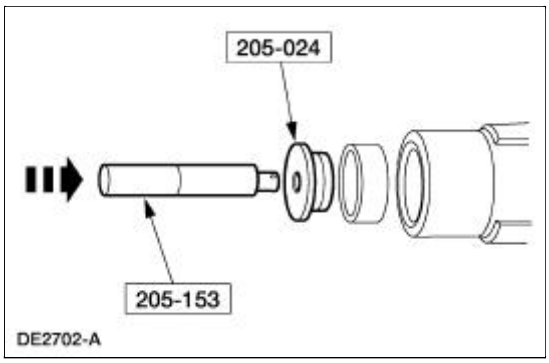
Check that the cups have seated correctly in their bores.



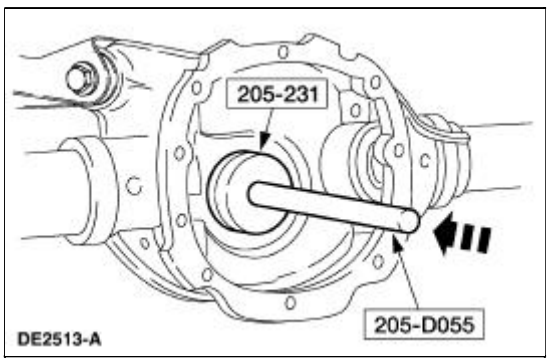
Using special tools 205-153, -024, -231, and -D055

NOTE: This is an alternate method for installing the pinion bearing cups. Carry out this procedure if pinion bearing cup installation was not done in the previous steps.

4. Using the special tools, drive the outer differential drive pinion bearing cup into the differential housing.



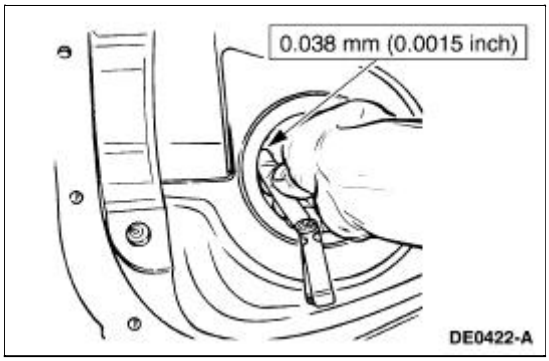
5. Using the special tools, drive the inner rear axle pinion bearing cup into the differential housing.



6. **CAUTION: Always install new differential pinion bearings when installing new pinion bearing cups.**

   NOTE: If the feeler gauge can fit between a cup and the bottom of its bore at any point around the cup, remove and reseat the cup.

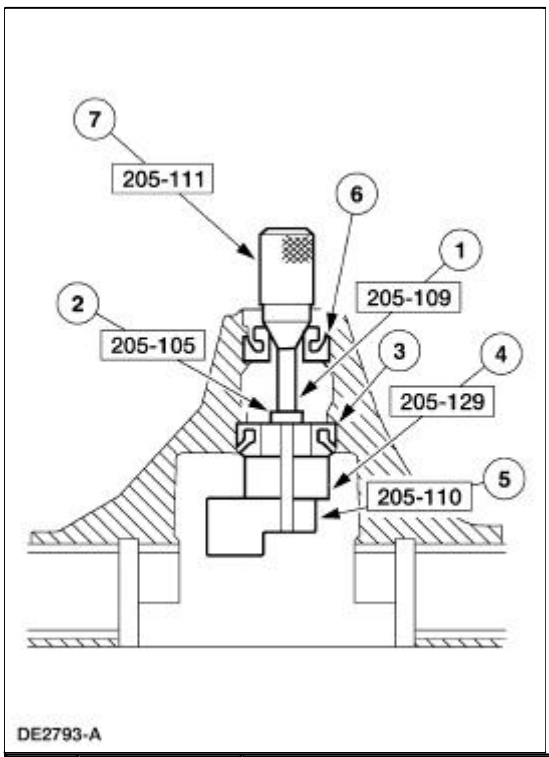
   Check that the cups have seated correctly in their bores.



Setting pinion depth

7. **NOTE:** Apply only a light oil film on the differential pinion bearings before assembling the tools.

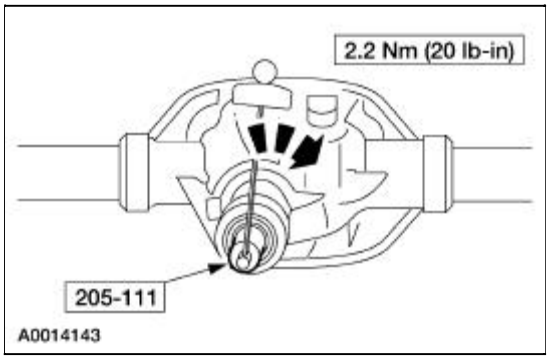
   Assemble and position the following in the differential housing.



Item	Part Number	Description
1	205-109	Adapter for 205-S127 (T76P-4020-A9)
2	205-105	Adapter for 205-S127 (T76P-4020-A3) (1.612 inch O.D.)
3	4630	Rear (inner) pinion bearing
4	205-129	Adapter for 205-S127 (T79P-4020-A18) (1.1884 inch thick)
5	205-110	Adapter for 205-S127 (T76P-4020-A10) (1.7 inch thick)
6	4621	Front (outer) pinion bearing
7	205-111	Adapter for 205-S127 (T76P-4020-A11)

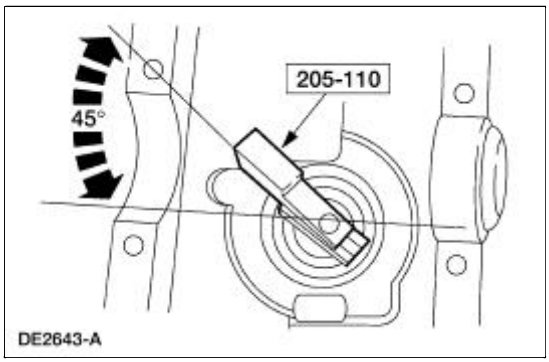
8. **NOTE:** This step duplicates final differential pinion bearing preload.

Tighten the special tool to specification.

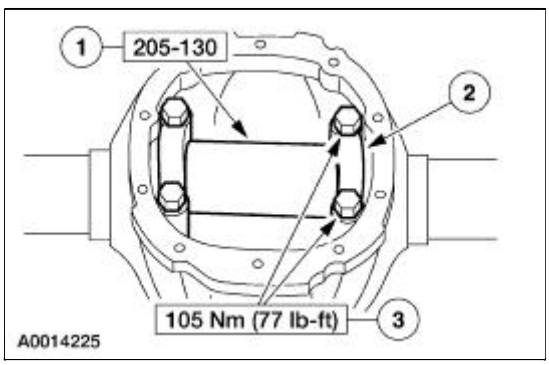


9. **NOTE:** Offset the special tool to obtain an accurate reading.

   Rotate the special tool several half-turns to make sure the differential pinion bearings seat correctly and position the special tool as shown.



10. Install the special tool.
    1. Position the special tool.
    2. Install the bearing caps.
    3. Install the four bolts.

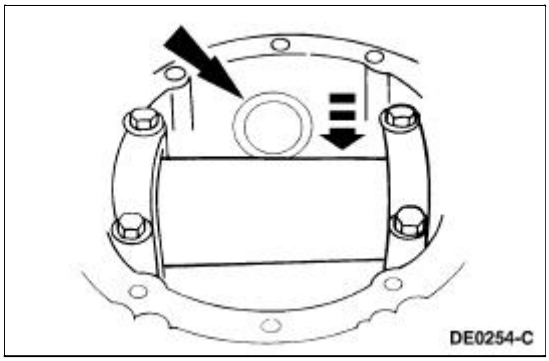


11. **NOTE:** Use only flat, clean drive pinion bearing adjustment shims (4663).

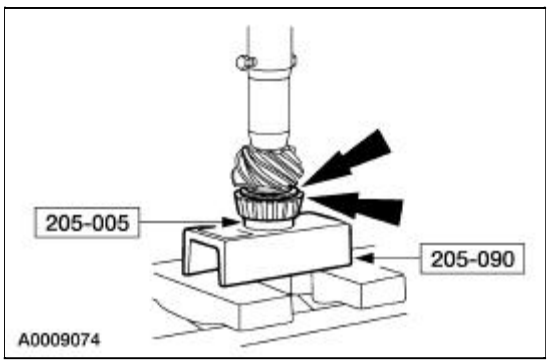
    NOTE: Selection of too thick a shim results in a deep tooth contact at final assembly. Do not attempt to force the shim between the special tools. A slight drag indicates correct shim selection.

    Use a drive pinion bearing adjustment shim as a gauge for shim selection.

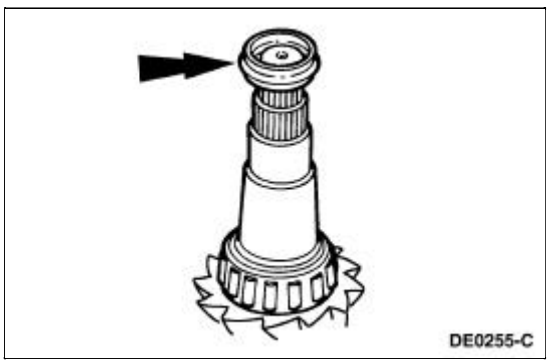
    - After determining the correct shim thickness, remove the special tools.



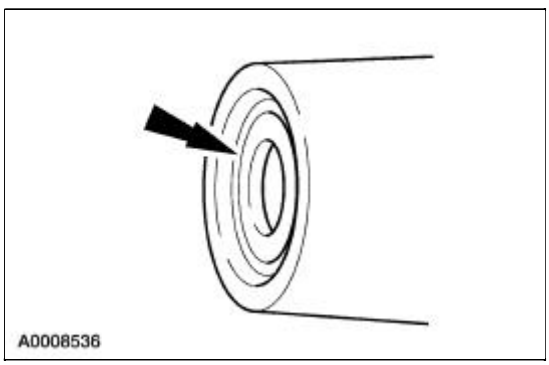
12. Position the correct thickness drive pinion bearing adjustment shim and the differential pinion bearing on the drive pinion gear. Using a suitable press and the special tools, press the differential pinion bearing until it seats firmly against the drive pinion gear.



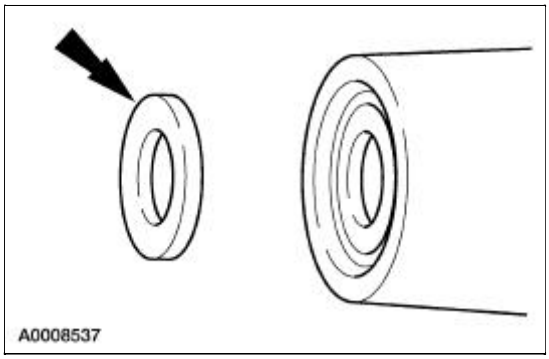
13. Place a new collapsible spacer on the pinion shaft against the pinion stem shoulder.



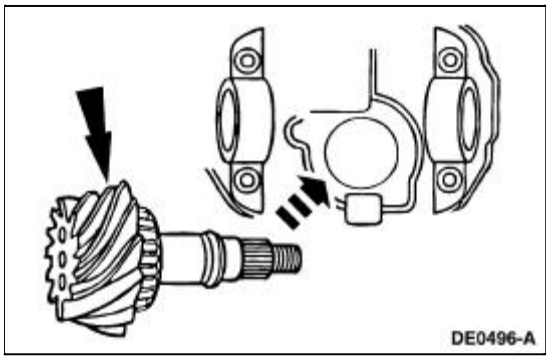
14. Install the outer differential pinion bearing.



15. Install the rear axle drive pinion shaft oil slinger.

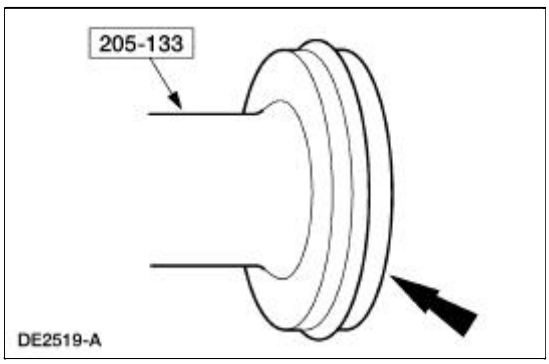


16. Install the drive pinion assembly (drive pinion, shims, bearing, and the collapsible spacer) into the differential housing bore.



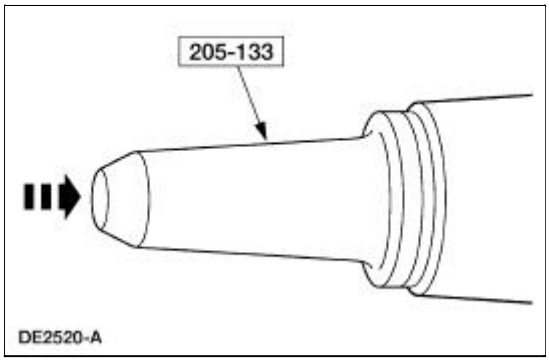
17. **NOTE:** Coat the rear axle drive pinion seal lips with Premium Long-Life Grease XG-1-C or equivalent meeting Ford specification ESA-M1C75-B.

    Place the rear axle drive pinion seal on the special tool.



18. **CAUTION: If the rear axle drive pinion seal becomes misaligned during installation, remove it and install a new one.**

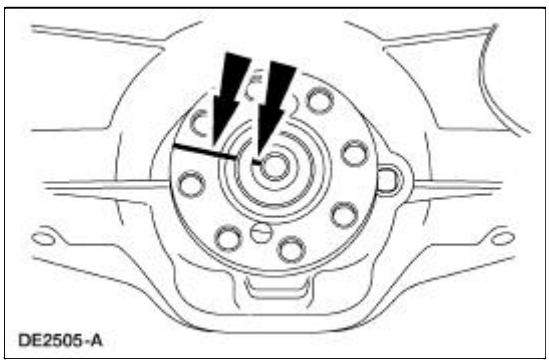
    Position the rear axle drive pinion seal in the seal bore, and use the special tool to drive the seal into place.



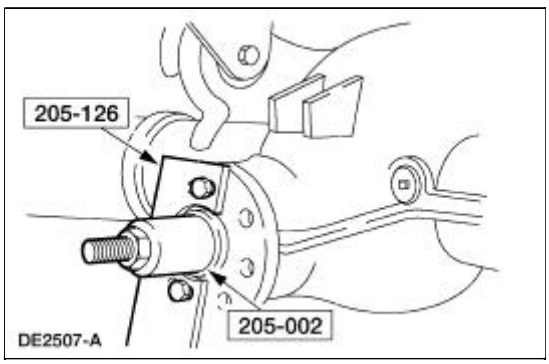
19. Lubricate the pinion flange splines.
    - Use SAE 75W-140 High Performance Rear Axle Lubricant F1TZ-19580-B or equivalent meeting Ford specification WSL-M2C192-A.

20. **NOTE:** Disregard the index marks if installing a new pinion flange.

    Position the pinion flange.



21. Using the special tools, install the pinion flange.

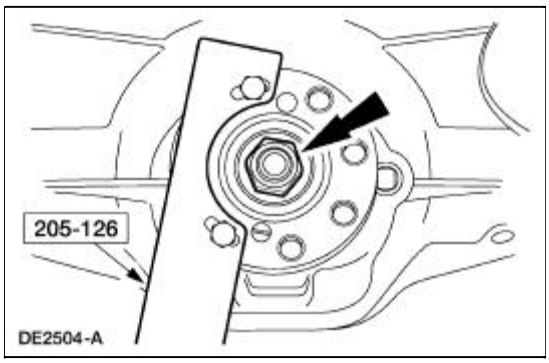


22. **CAUTION: Do not under any circumstance loosen the nut to reduce preload. If it is necessary to reduce preload, install a new collapsible spacer and nut.**

    CAUTION: Remove the special tool while taking readings with the Nm (inch-pound) torque wrench.

    Tighten the nut to set the preload.
    - Rotate the drive pinion occasionally to make sure the differential pinion bearings seat correctly. Take frequent differential pinion bearing torque preload readings by rotating the drive pinion with a Nm (inch-pound) torque wrench.

- For new differential pinion bearings, tighten the nut to specification. Refer to torque specifications for new differential pinion bearings in the Specifications portion of this section.
- For used differential pinion bearings, if the preload recorded prior to disassembly is lower than the specification for used bearings, then tighten the nut to specification. Refer to torque specifications for used differential pinion bearings in the Specifications portion of this section.
- For used differential pinion bearings, if the preload recorded prior to disassembly is higher than the specification for used bearings, then tighten the nut to the original reading as recorded.



Final assembly

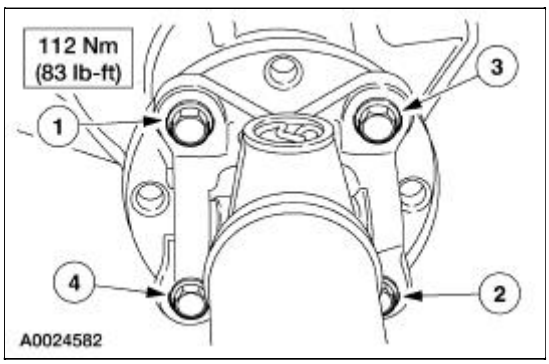
23. Install the differential assembly in the differential housing. For additional information, refer to Differential Case in this section.

24. **CAUTION: Align the index marks.**

    CAUTION: Install the driveshaft with new bolts. If new bolts are not available, apply Threadlock and Sealer EOAZ-19554-AA or equivalent meeting Ford specification WSK-M2G351-A5 to the threads of the original bolts.

    CAUTION: The driveshaft centering socket yoke fits tightly on the pinion flange pilot. To make sure that the yoke seats squarely on the flange, tighten the bolts evenly in a cross pattern as shown.

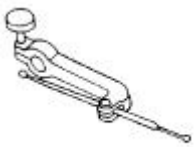
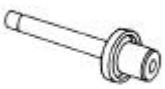
    Connect the driveshaft. For additional information, refer to Section 205-01 .



25. Lower the vehicle.

Differential Case

Special Tool(s)

ST2026-A	2-Jaw Puller 205-D072 (D97L-4221-A) or equivalent
ST1214-A	Dial Indicator Gauge with Holding Fixture 100-002 (TOOL-4201-C) or equivalent
 ST1348-A	Gauge, Clutch Housing 308-021 (T75L-4201-A) or equivalent
ST1485-A	Installer, Differential Shim 205-220 (T85L-4067-AH)
 ST1375-A	Installer, Differential Side Bearing 205-010 (T57L-4221-A2)
ST1543-A	Step Plate 205-D061 (D83T-4205-C2) or equivalent

Removal

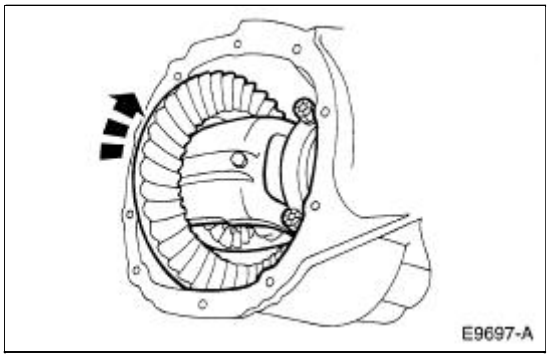
1. Remove the differential housing cover (4033) and drain the rear axle (4001). For additional information, refer to Differential Housing Cover in this section.

2. **CAUTION: Reinstall the differential pinion shaft (4211) and the bolt in the differential case (4204) after removing the axle shafts (4234).**

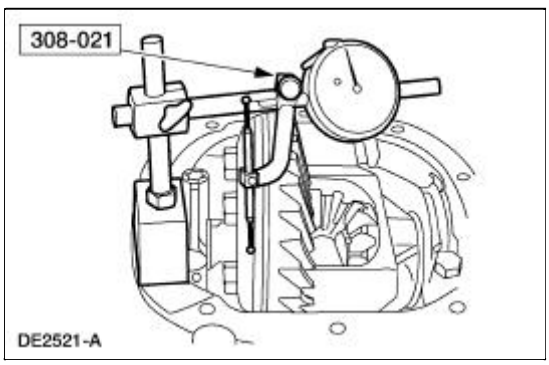
Remove the axle shafts. For additional information, refer to Axle Shaft in this section.

3. Wipe the lubricant from the internal working parts and inspect the parts for wear and damage.

4. Rotate the differential assembly to check for roughness indicating bearing/gear damage.

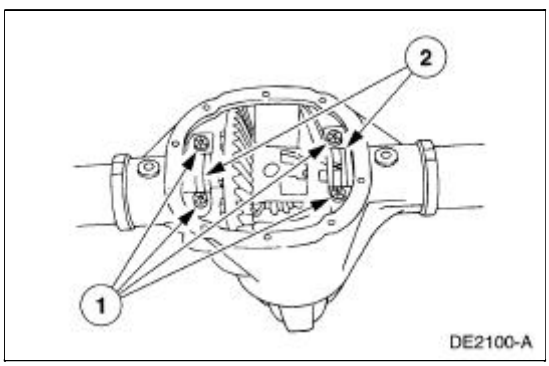


5. Using a suitable dial indicator and the special tool, measure and note the ring gear backface runout.



6. **CAUTION: Mark the position and location of the bearing caps, as the arrows may not be visible. Always install the bearing caps in their identical locations and positions.**

Remove the bearing caps.
1. Remove the bolts.
2. Remove the bearing caps.

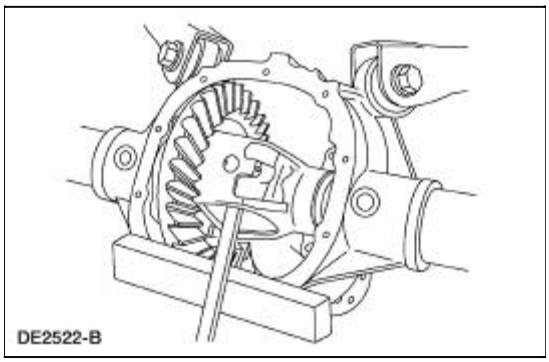


7. **WARNING: Do not allow the differential assembly to fall. Failure to follow these instructions may result in personal injury and component damage.**

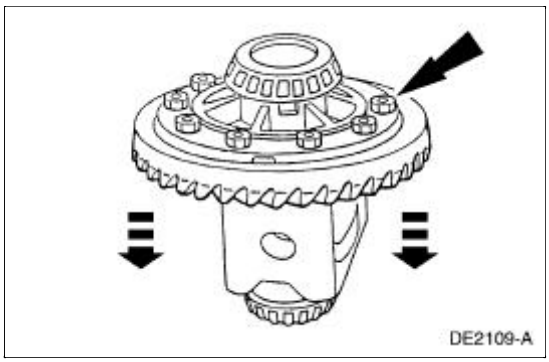
CAUTION: Place a wood block between the pry bar and the differential housing

(4010) to protect the machined surface from damage.

Using a pry bar and a wood block, remove the differential assembly from the differential housing.

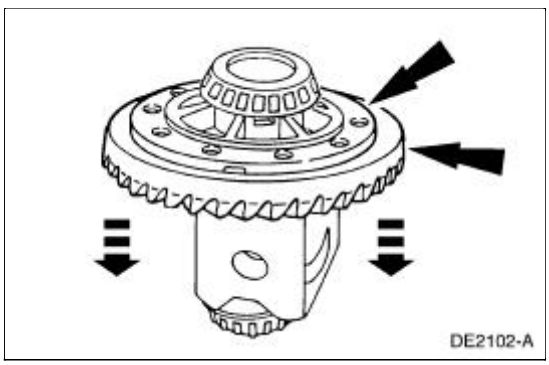


8. Remove the 10 bolts.



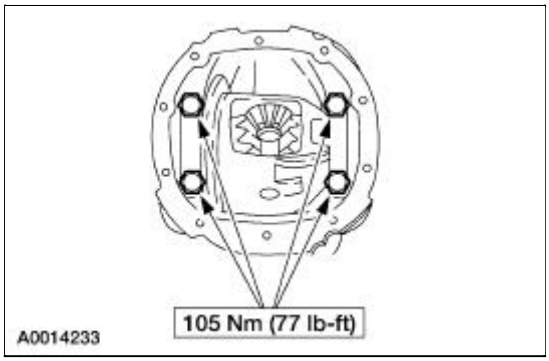
9. **CAUTION: Do not damage the threads in the bolt holes.**

   Insert a punch in the bolt holes, and drive off the ring gear.

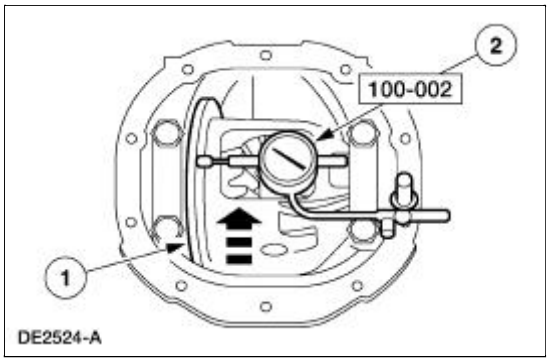


10. If the ring gear backface runout measurement, taken at the beginning of this procedure, did not exceed the specification, proceed to the appropriate procedure as necessary: Drive Pinion , Differential Case and Ring Gear—Conventional or Differential Case and Ring Gear—Traction-Lok® in this section, or to Installation in this procedure. If the ring gear backface runout measurement, taken at the beginning of this procedure, exceeded the specification, the cause may be a warped ring gear, differential case/differential bearing damage. Proceed as follows to verify the cause of the excessive runout.

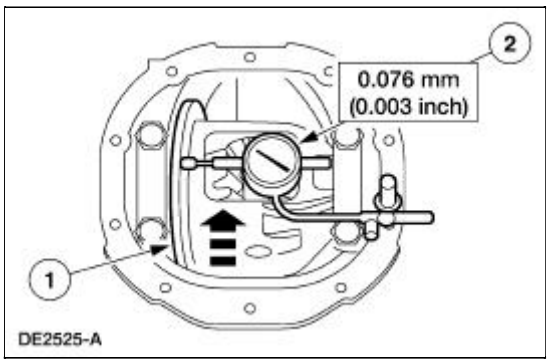
11. Position the differential assembly, including the differential bearing cups (4222) and differential bearing shims (4067), in the differential housing. Install the bearing caps and bolts.



12. Position the special tool.
    1. Rotate the differential case to verify that the differential bearings (4221) have seated correctly.
    2. Position the special tool.

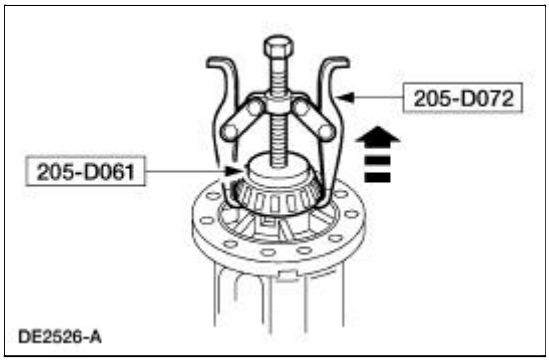


13. Measure and note the differential case runout.
    1. Rotate the differential case.
    2. Note the runout.
        - If the runout does not exceed the specification, install a new ring gear and drive pinion gear. For additional information, refer to Drive Pinion in this section and to Installation in this procedure.
        - If the runout exceeds the specification, the ring gear is true and the concern is due to either differential case/differential bearing damage. Proceed as follows.

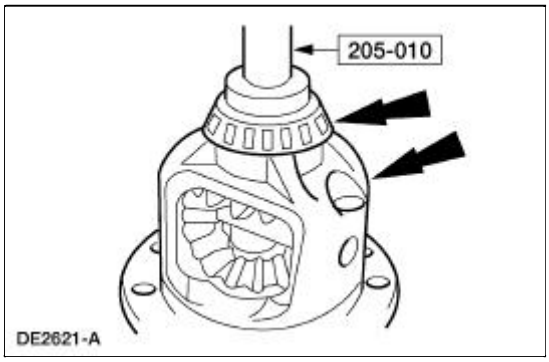


14. Remove the differential assembly from the differential housing.

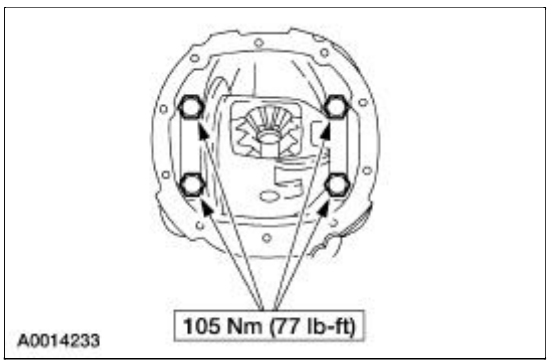
15. Using the special tools, remove the differential bearings.



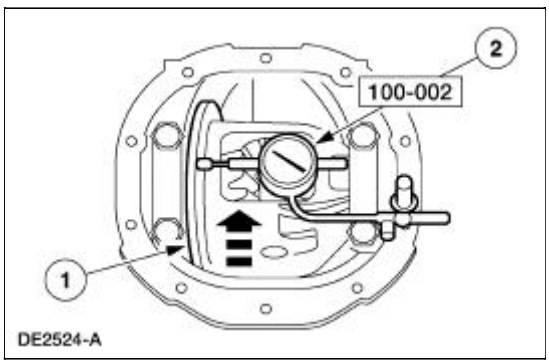
16. Using the special tool, install the new differential bearings.



17. Position the differential assembly, including the differential bearing cups and differential bearing shims, in the differential housing. Install the bearing caps and bolts.

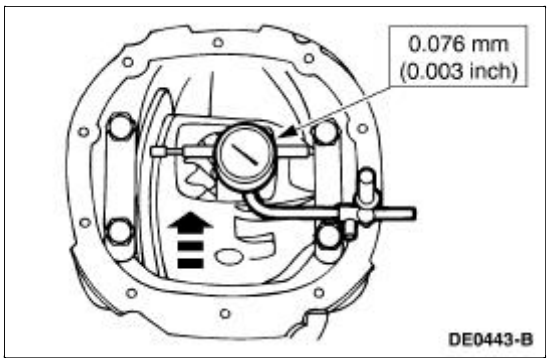


18. Position the special tool.
    1. Rotate the differential case to verify that the differential bearings have seated correctly.
    2. Position the special tool.



19. Measure the differential case runout.

- If the runout does not exceed the specification, use the new differential bearings for assembly.
- If the runout exceeds the specification, install a new differential case. For additional information, refer to Differential Case and Ring Gear—Conventional or Differential Case and Ring Gear—Traction-Lok® in this section.

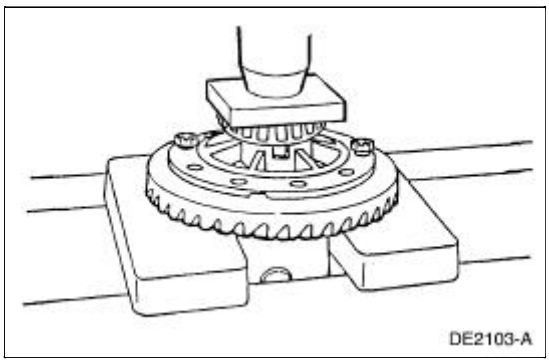


20. Remove the differential assembly from the differential housing.

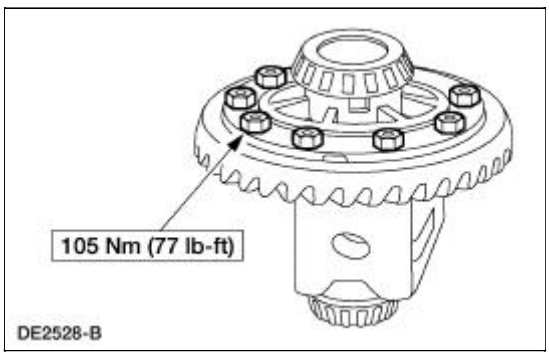
Installation

All axles

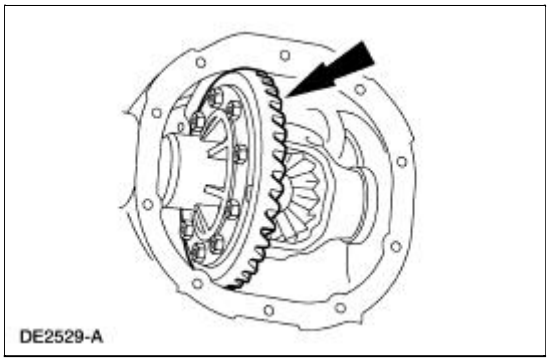
1. Position the ring gear and the differential case. Align the bolt holes by starting two bolts through the holes in the differential case and the ring gear. Press the ring gear on the differential case.



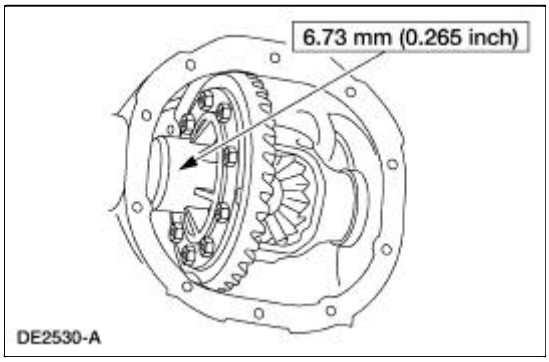
2. Install the bolts.
   - Apply Stud and Bearing Mount EOAZ-19554-BA or equivalent meeting Ford specification WSK-M2G349-A1 to the bolt threads.



3. With the pinion depth set and the pinion installed, place the differential assembly in the differential housing.



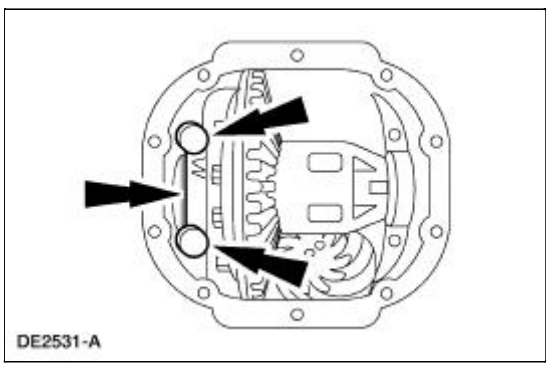
4. Install a differential bearing shim on the left side.



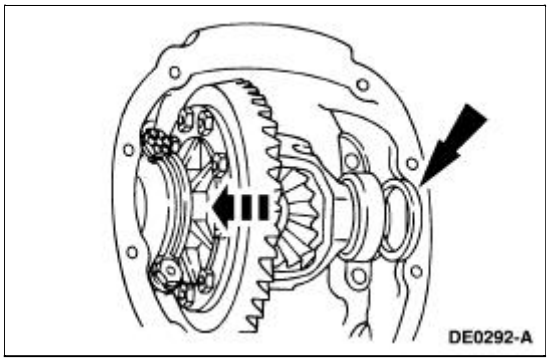
5. **CAUTION: Always install the bearing caps in their identical locations and positions.**

   NOTE: Apply pressure toward the left side to make sure the left differential bearing cup seats correctly.

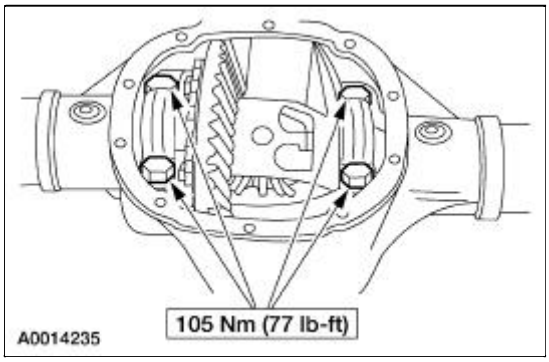
   Install the left bearing cap and loosely install the bolts.



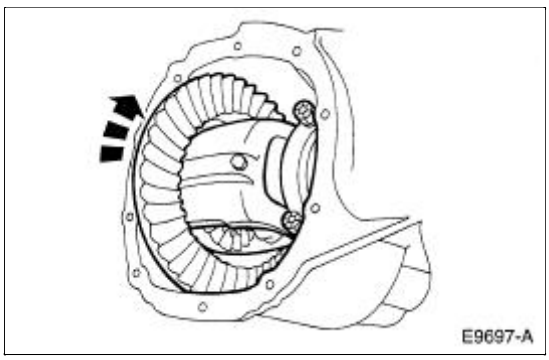
6. Install progressively larger differential bearing shims on the right side until the largest shim selected is installed by hand.



7. Install the right side bearing cap and tighten the left side and right side bolts to specification.



8. Rotate the differential assembly several times to verify that the differential bearings have seated correctly.

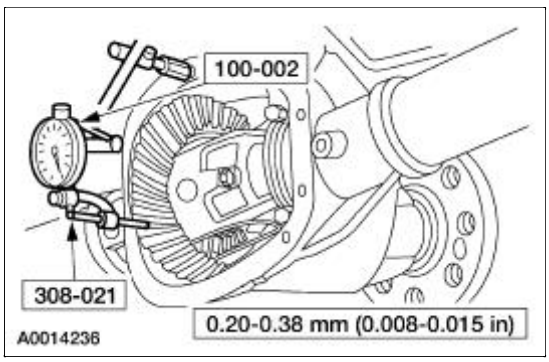


Measuring backlash

9. Using the special tools, measure the ring gear backlash.
    - If backlash is within the specification, refer to Backlash within specification in this procedure. The specification shown is the full allowable range. For the preferred range, refer to Specifications in this section.
    - If a zero backlash condition occurs, refer to Zero backlash in this procedure.
    - If backlash is not within the specification, refer to Backlash not within specification in this procedure.

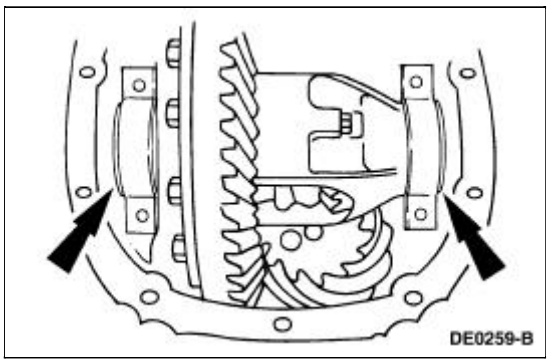
Backlash Change Required		Thickness Change Required	
mm	Inch	mm	Inch
0.025	0.001	0.050	0.002
0.050	0.002	0.050	0.002

0.076	0.003	0.101	0.004
0.101	0.004	0.152	0.006
0.127	0.005	0.152	0.006
0.152	0.006	0.203	0.008
0.177	0.007	0.254	0.010
0.203	0.008	0.254	0.010
0.228	0.009	0.304	0.012
0.254	0.010	0.355	0.014
0.279	0.011	0.355	0.014
0.304	0.012	0.406	0.016
0.330	0.013	0.457	0.018
0.335	0.014	0.457	0.018
0.381	0.015	0.508	0.020

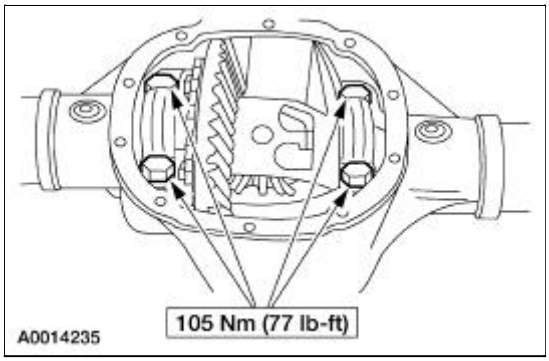


Zero backlash

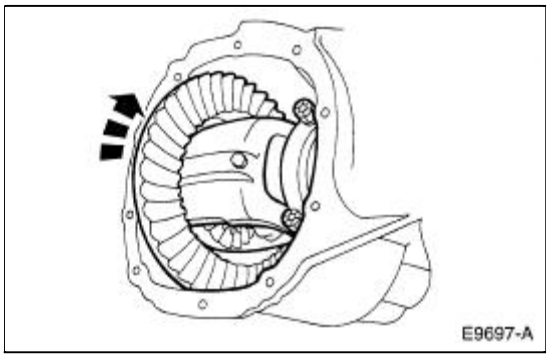
10. If a zero backlash condition occurs, remove the bearing caps and add 0.51 mm (0.020 inch) to the RH side and subtract 0.51 mm (0.020 inch) from the LH side to allow backlash indication.



11. Install the bearing caps and the bolts.



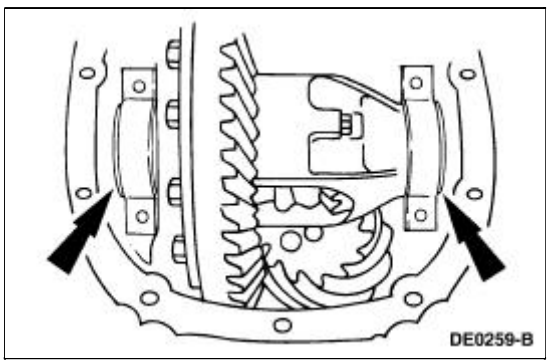
12. Rotate the differential assembly several times to verify that the differential bearings have seated correctly.



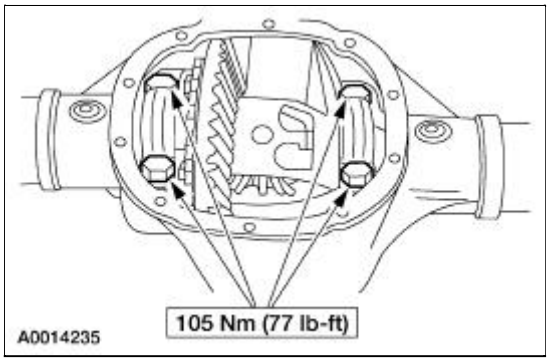
13. Measure the backlash. Refer to Measuring backlash in this procedure.

Backlash not within specification

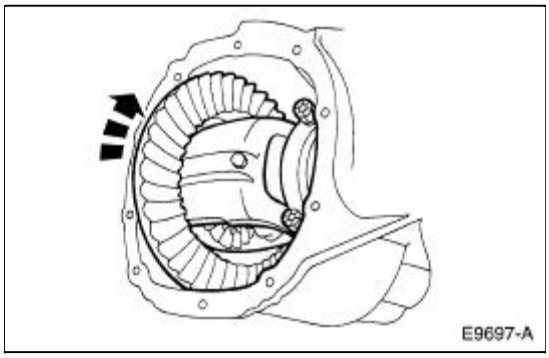
14. To increase or decrease the backlash, remove the bearing caps and install a thicker shim and thinner shim accordingly.
    - If backlash is not within the specification, increase the thickness of one differential bearing shim and decrease the thickness of the other differential bearing shim by the same amount.



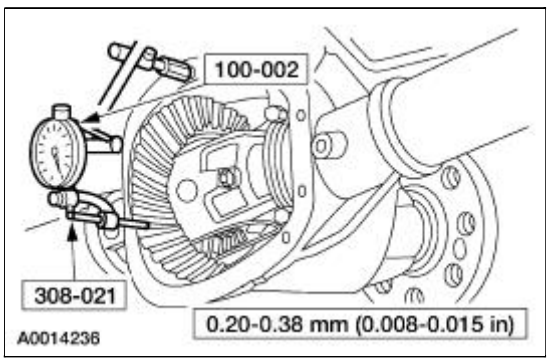
15. Install the bearing caps and the bolts.



16. Rotate the differential several times to verify that the differential bearings have seated correctly.



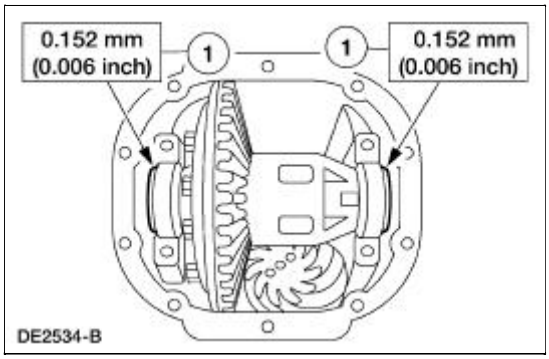
17. Using the special tools, recheck the backlash.
    - If backlash is within the specification, go to Backlash within specification in this procedure. If backlash is not within the specification, repeat Backlash not within specification in this procedure.
    - The specification shown is the full allowable range. For the preferred range, refer to Specifications in this section.

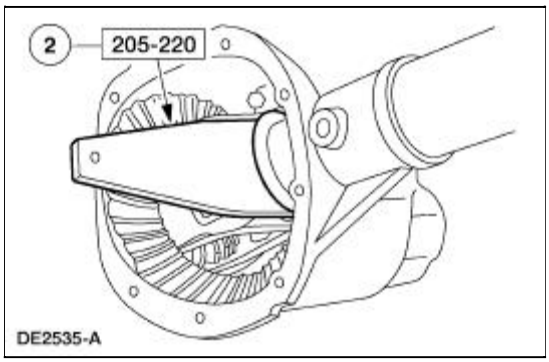


Backlash within specification

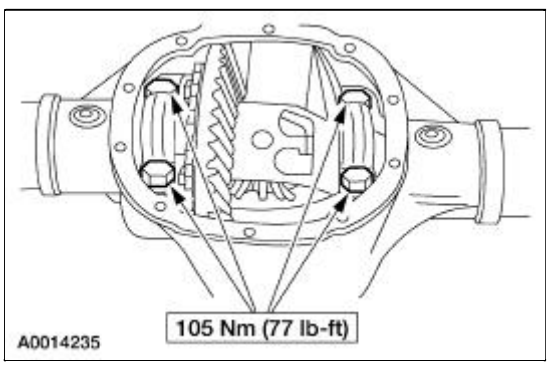
18. Remove the bolts and bearing caps.

19. Set the differential bearing preload.
    1. To establish differential bearing preload, increase both left and right differential bearing shim sizes by the specification shown.
    2. Using the special tool, fully seat the differential bearing shims. Make sure the assembly rotates freely.

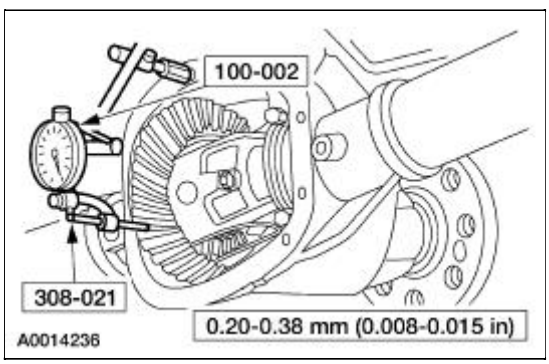




20. Install the bearing caps and bolts.



21. Using the special tools, recheck the backlash.
    - The specification shown is the full allowable range. For the preferred range, refer to Specifications in this section.



22. Install the axle shafts. For additional information, refer to Axle Shaft in this section.

23. Install the differential housing cover and refill the rear axle with specified lubricant. For additional information, refer to Differential Housing Cover in this section.

24. Lower the vehicle.

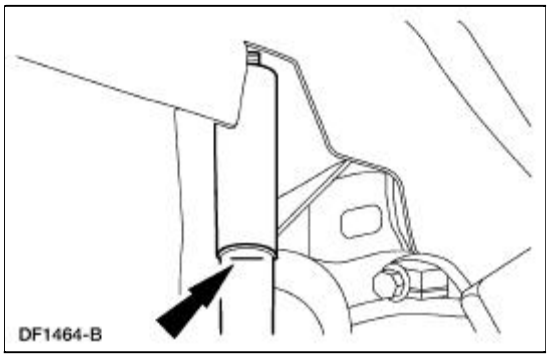
Axle Housing

Removal and Installation

1. **CAUTION: The vehicle must be on level ground and at curb height.**

   Mark the rear shock absorbers relative to their protective sleeve.

   - During installation, raise the suspension to this reference mark before tightening the suspension fasteners.

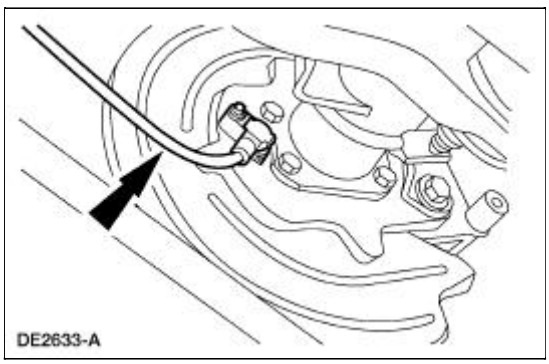


2. Raise and support the vehicle. For additional information, refer to Section 100-02 .

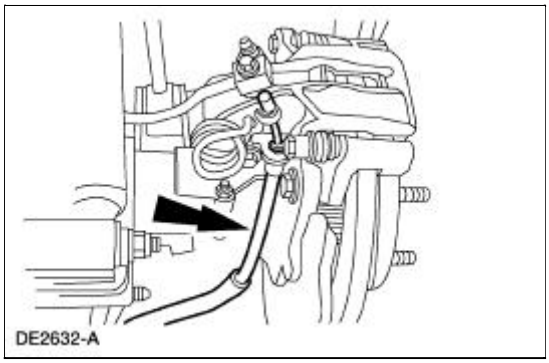
3. Remove the rear wheel and tire assemblies. For additional information, refer to Section 204-04 .

4. **NOTE:** If necessary, use Rust Penetrant and Inhibitor F2AZ-19A501-A meeting Ford specification ESR-M99C56-A to loosen the sensor for removal.

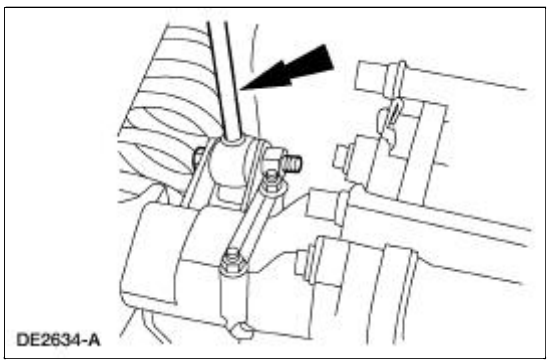
   Remove the rear anti-lock brake sensors from the rear disc brake adapters. For additional information, refer to Section 206-09A .



5. Disconnect the parking brake cables and conduits from the rear disc brake calipers. For additional information, refer to Section 206-05 .



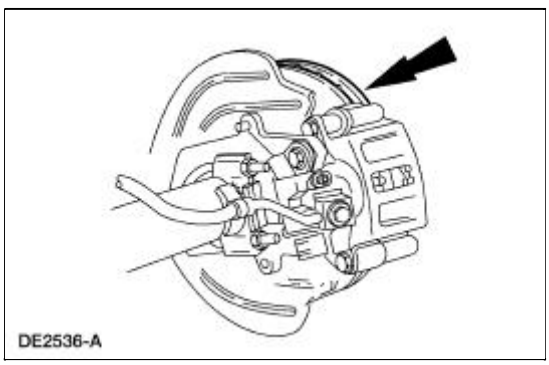
6. Disconnect the rear axle drive line vibration damper from the axle.



7. **CAUTION: Index-mark the brake discs and the wheel studs prior to brake disc removal.**

   CAUTION: Do not allow the calipers to hang from the brake hoses.

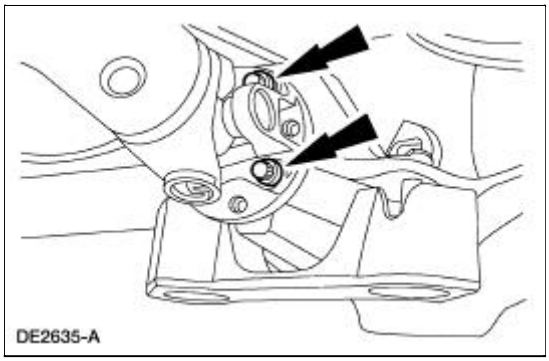
   Remove the rear brake discs. For additional information, refer to Section 206-04 .

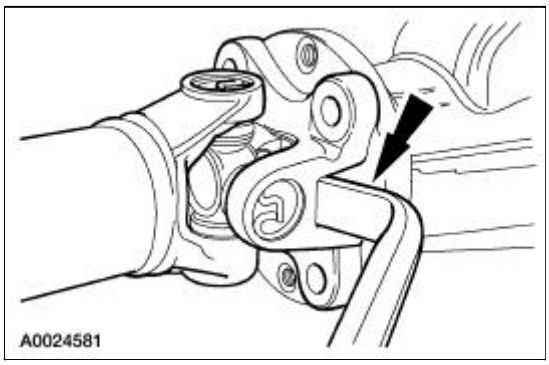


8. **CAUTION: Index-mark the driveshaft flange and pinion flange (4851) to maintain initial balance during installation.**

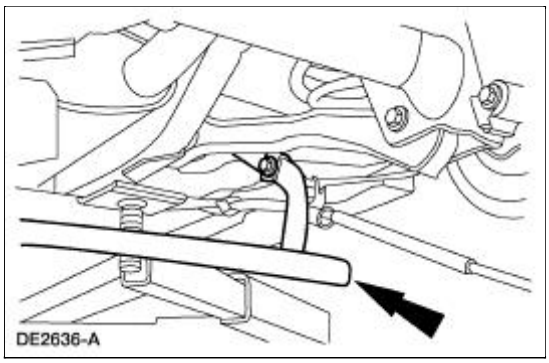
   CAUTION: The driveshaft centering socket yoke fits tightly on the pinion flange pilot. Never hammer on the driveshaft or any of its components to disconnect the yoke from the flange. Pry only in the area shown, with a suitable tool, to disconnect the yoke from the flange.

   Disconnect and position the driveshaft out of the way. For additional information, refer to Section 205-01 .

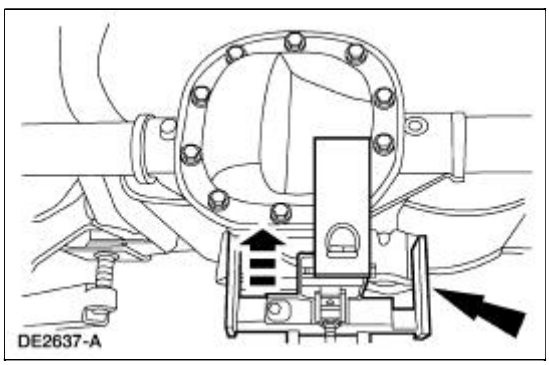




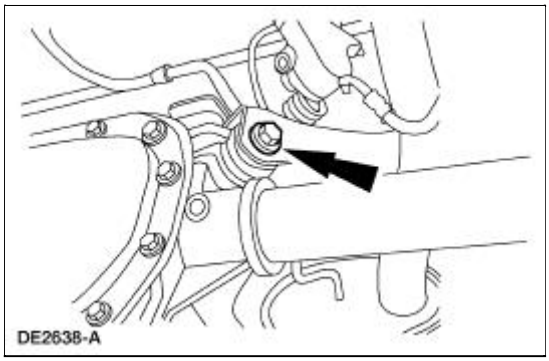
9. Remove the stabilizer bar. For additional information, refer to Section 204-02 .



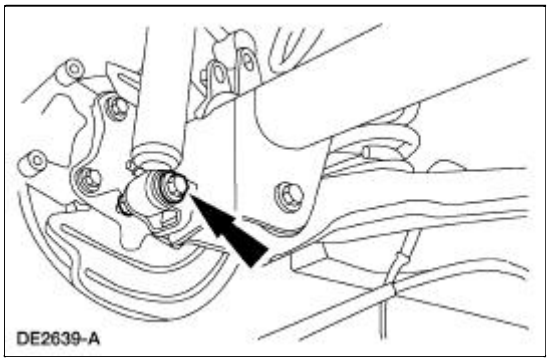
10. Position a suitable transmission jack under the differential housing (4010) for support and strap it securely in place.



11. Remove and discard the nuts and bolts retaining the upper suspension arm and bushings to the differential housing.



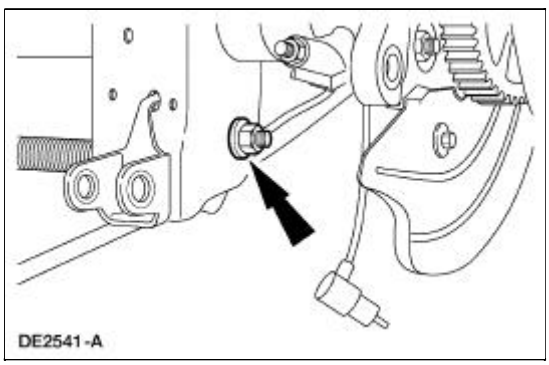
12. Remove and discard the nuts and bolts retaining the shock absorbers to the axle.



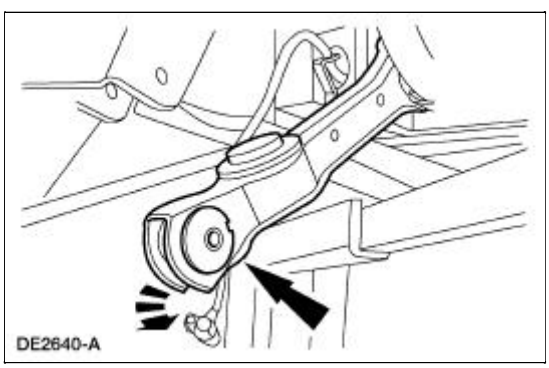
13. Lower the differential housing to unload the rear springs.

14. Remove the rear springs.

15. Remove and discard the nuts and bolts retaining the lower suspension arm and bushings to the axle.



16. Disconnect the lower suspension arm and bushings from the axle.



17. Remove the axle from the vehicle.

18. **CAUTION: Align the index marks on the driveshaft centering socket yoke and the pinion flange.**

CAUTION: Install the driveshaft with new bolts. If new bolts are not available, apply Threadlock and Sealer EOAZ-19554-AA or equivalent meeting Ford specification WSK-M2G351-A5 to the threads of the original bolts.

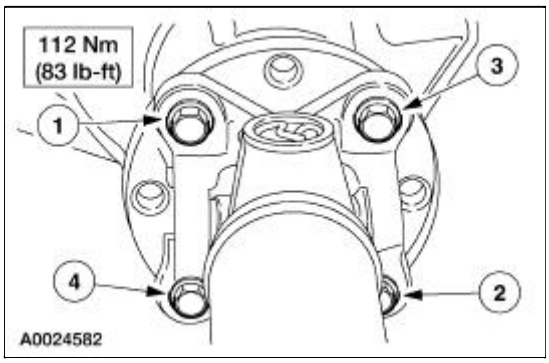
CAUTION: The driveshaft centering socket yoke fits tightly on the pinion flange pilot. To make sure that the yoke seats squarely on the flange, tighten the bolts evenly in a cross pattern as shown.

CAUTION: Raise the suspension to the reference marks on the rear shock absorbers before tightening the suspension fasteners.

NOTE: Apply High Temperature Nickel Anti-Sieze Lubricant F6AZ-9L494-AA meeting Ford specification ESE-M124A-A to the rear anti-lock brake sensor body where it will make contact when installed.

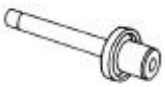
Follow the removal procedure in reverse order.

- Refer to Section 204-02 for rear suspension fastener tightening specifications.
- Refer to Section 204-04 for wheel nut tightening specification.



Differential Case and Ring Gear —Conventional

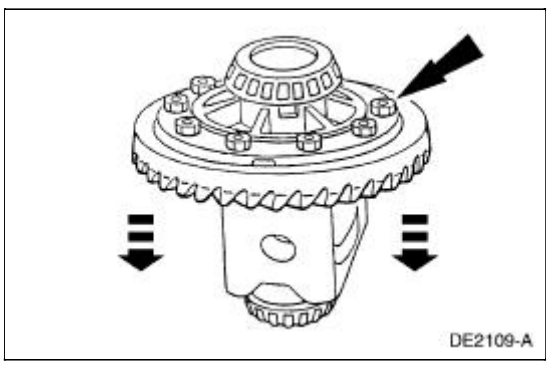
Special Tool(s)

ST2026-A	2-Jaw Puller 205-D072 (D97L-4221-A) or equivalent
 ST1375-A	Installer, Differential Side Bearing 205-010 (T57L-4221-A2)
ST1543-A	Step Plate 205-D061 (D83T-4205-C2) or equivalent

Disassembly

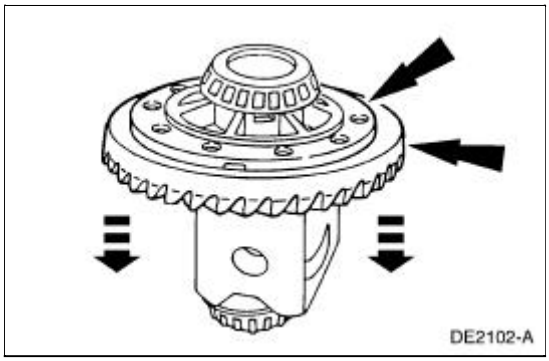
1. Remove the differential assembly from the differential housing. For additional information, refer to Differential Case in this section.

2. Remove the bolts.

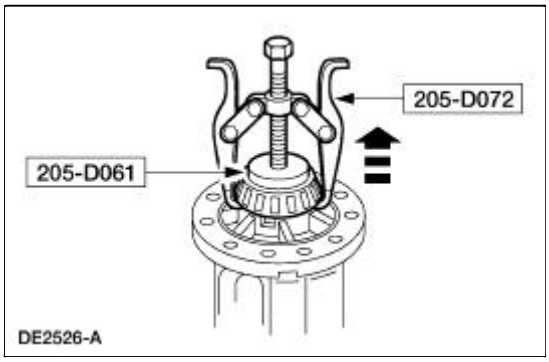


3. **CAUTION: Do not damage the threads in the bolt holes.**

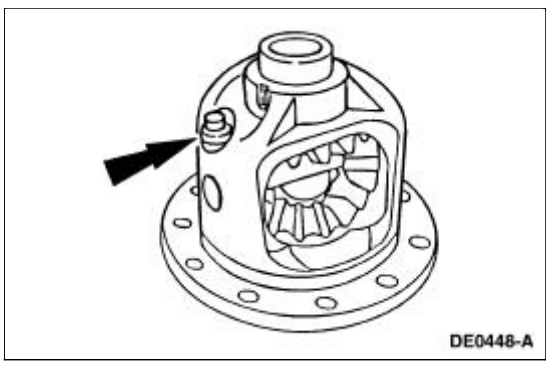
   Insert a punch in the bolt holes and drive off the ring gear.



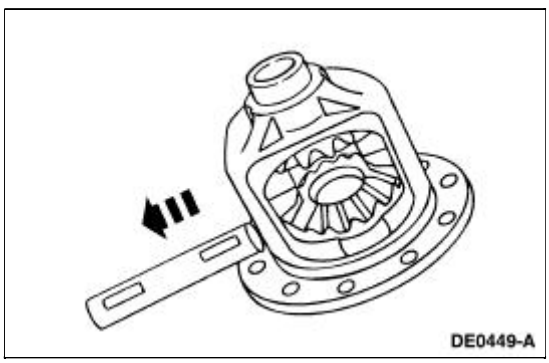
4. Using the special tools, remove the differential bearings (4221), if necessary.



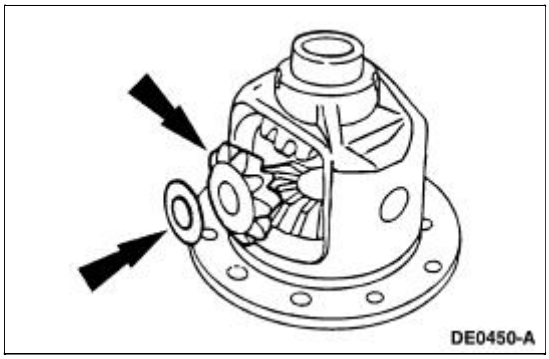
5. Remove the bolt.



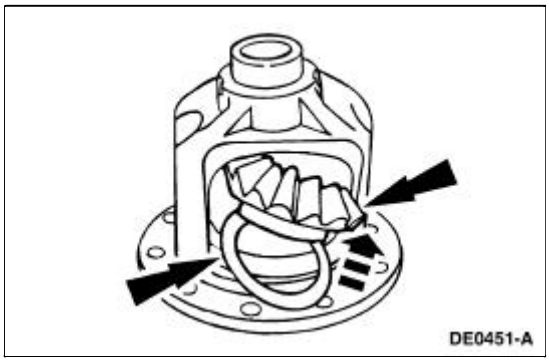
6. Remove the differential pinion shaft (4211).



7. Rotate and remove the differential pinion gears (4215) and differential pinion thrust washers (4230).

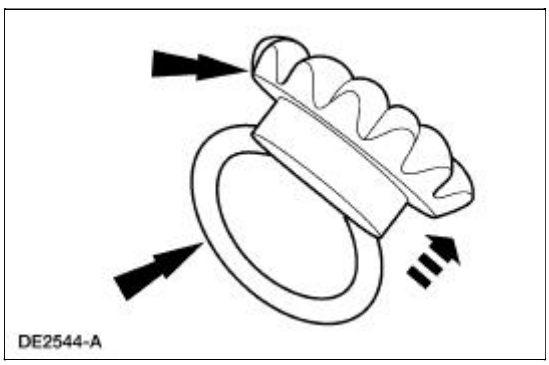


8. Remove the differential side gears (4236) and the differential side gear thrust washers (4228).

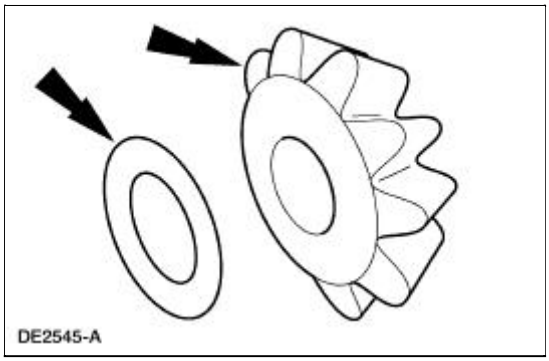


Assembly

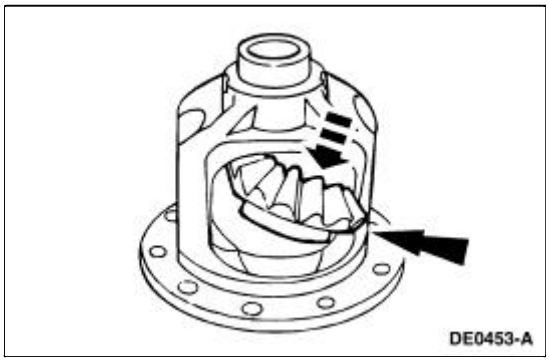
1. Lubricate the differential side gear thrust washers and the differential side gear journals, and assemble the washers to the gears.
    - Use SAE 75W-140 High Performance Rear Axle Lubricant F1TZ-19580-B or equivalent meeting Ford specification WSL-M2C192-A.



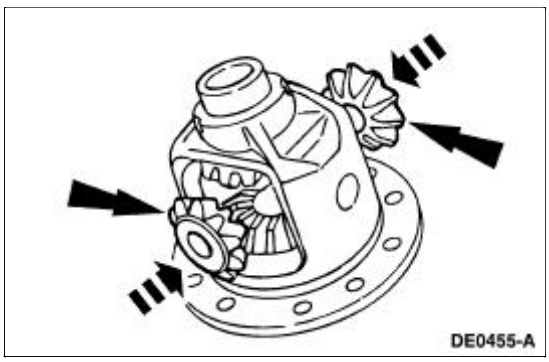
2. Lubricate the differential pinion thrust washers and the differential pinion gears, and assemble the washers to the gears.
    - Use SAE 75W-140 High Performance Rear Axle Lubricant F1TZ-19580-B or equivalent meeting Ford specification WSL-M2C192-A.



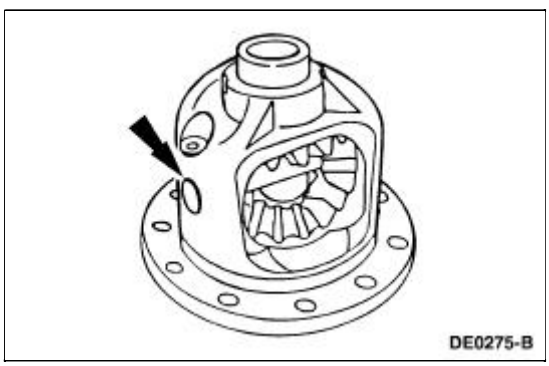
3. Position the differential side gear and thrust washer assemblies in the differential case.



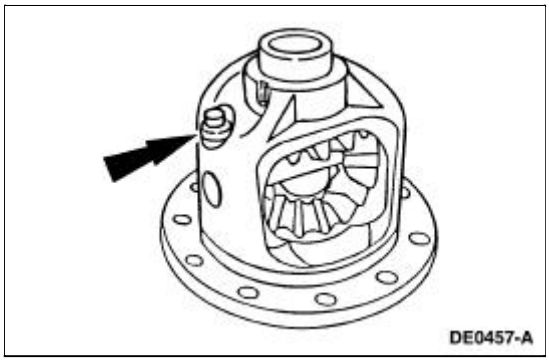
4. Engage the differential pinion gears with the differential side gears and rotate the pinion gears to align with the differential pinion shaft bore.



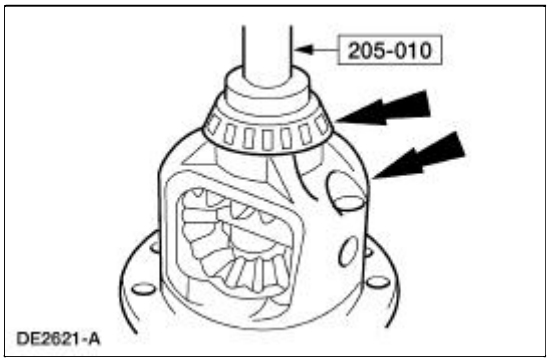
5. Insert the differential pinion shaft.
    - Align the hole in the differential pinion shaft with the hole in the differential case.



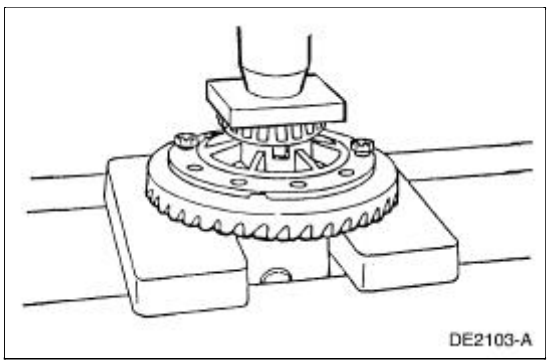
6. Install a new bolt finger-tight.



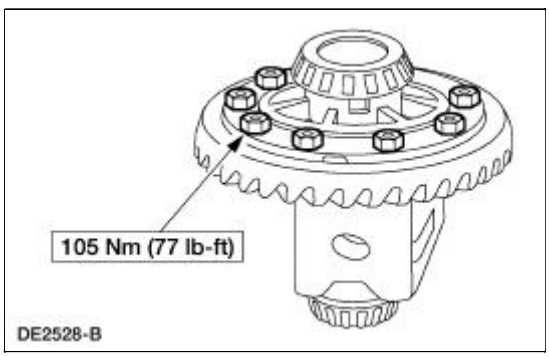
7. Using the special tool, install the new differential bearings, if removed.



8. Position the ring gear and the differential case. Align the bolt holes by starting two bolts through the holes in the differential case and the ring gear. Press the ring gear on the differential case.



9. Install the bolts.
    - Apply Stud and Bearing Mount EOAZ-19554-BA or equivalent meeting Ford specification WSK-M2G349-A1 to the bolt threads.

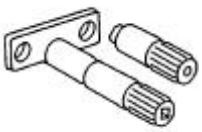
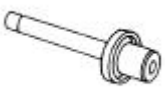


10. Install the differential assembly. For additional information, refer to Differential Case in this

section.

Differential Case and Ring Gear —Traction-Lok®

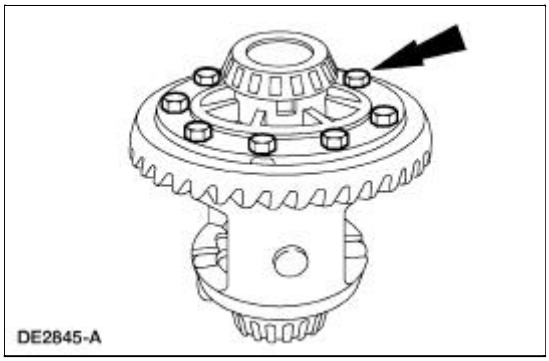
Special Tool(s)

ST2026-A	2-Jaw Puller 205-D072 (D97L-4221-A) or equivalent
 ST1265-A	Gauge, Differential Clutch 205-022 (T66L-4204-A)
ST1374-A	Gauge, Differential Clutch 205-135 (T80P-4946-A)
 ST1375-A	Installer, Differential Side Bearing 205-010 (T57L-4221-A2)
ST1543-A	Step Plate 205-D061 (D83T-4205-C2) or equivalent

Disassembly

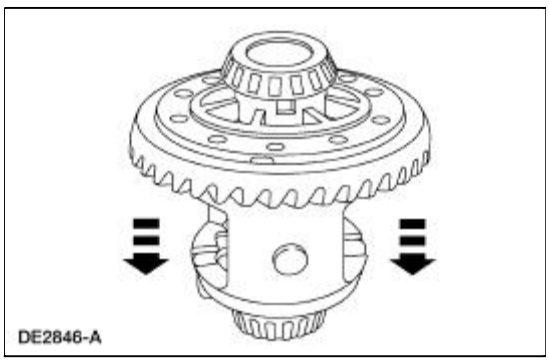
1. Remove the differential assembly from the differential housing. For additional information, refer to Differential Case in this section.

2. Remove the 10 bolts.

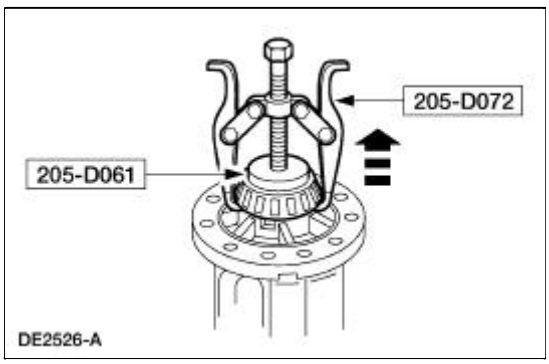


3. **CAUTION: Do not damage the threads in the bolt holes.**

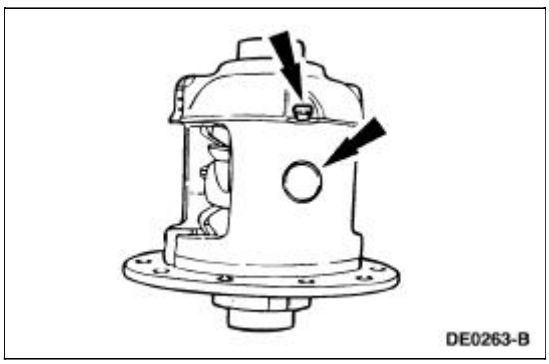
   Insert a punch in the bolt holes, and drive off the ring gear.



4. Using the special tools, remove the differential bearings (4221), if necessary.



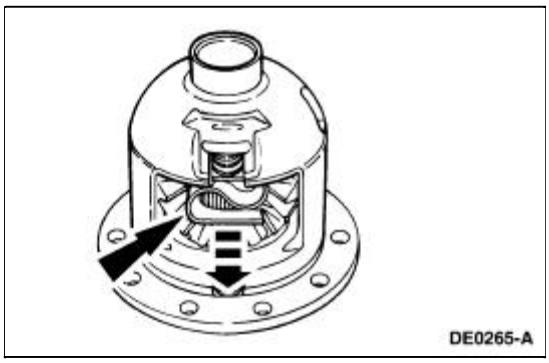
5. Remove the bolt and the differential pinion shaft (4211).



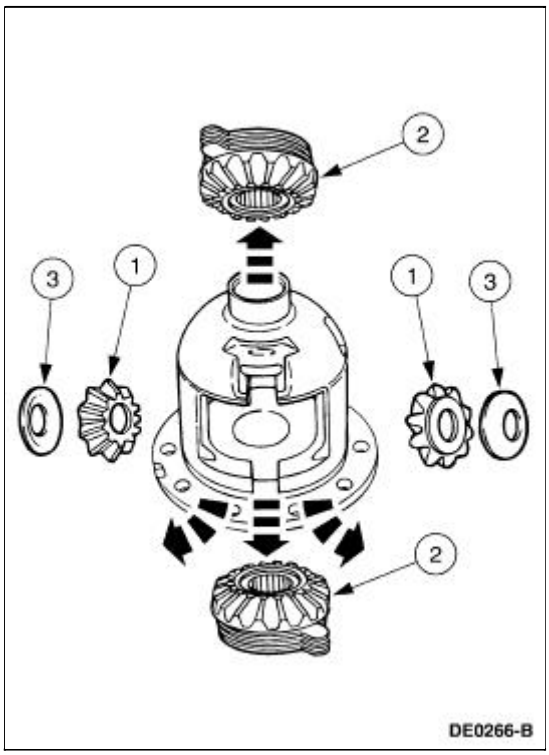
6. **WARNING: Due to the spring tension, use care when removing the differential**

clutch spring (4214). Failure to follow these instructions may result in personal injury.

Remove the differential clutch spring.



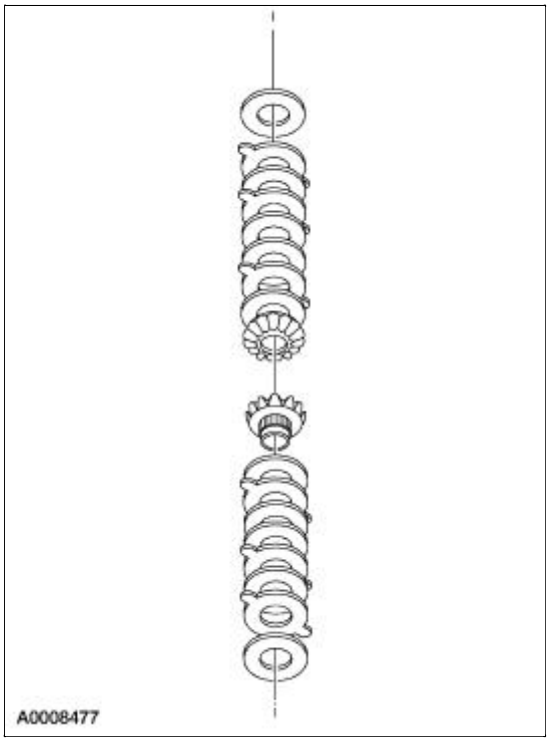
7. Remove the differential gears.
    1. Remove the two differential pinion gears (4215).
    2. Remove the two differential side gears (4236).
    3. Remove the two differential pinion thrust washers (4230).



8. **CAUTION: Keep the differential clutch packs (4947) in order. Do not mix them. Always reassemble them in the same sequence.**

Separate the differential clutch packs and shims from the differential side gears and tag them "right" and "left".

- Clean and inspect the remaining differential components for wear and damage and install new parts as necessary.



9. **CAUTION: Do not use acids or solvents when cleaning the differential clutch pack. Wipe components only with a clean, lint-free cloth.**

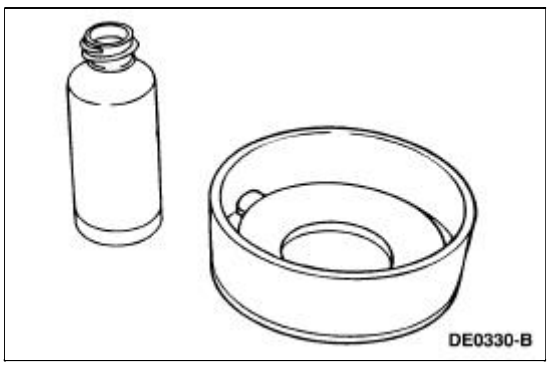
   Clean and inspect the differential clutch packs for wear and damage and install new parts as necessary.

Assembly

1. **CAUTION: 118 ml (4 oz) of the specified Ford Friction Modifier must be used in the axle.**

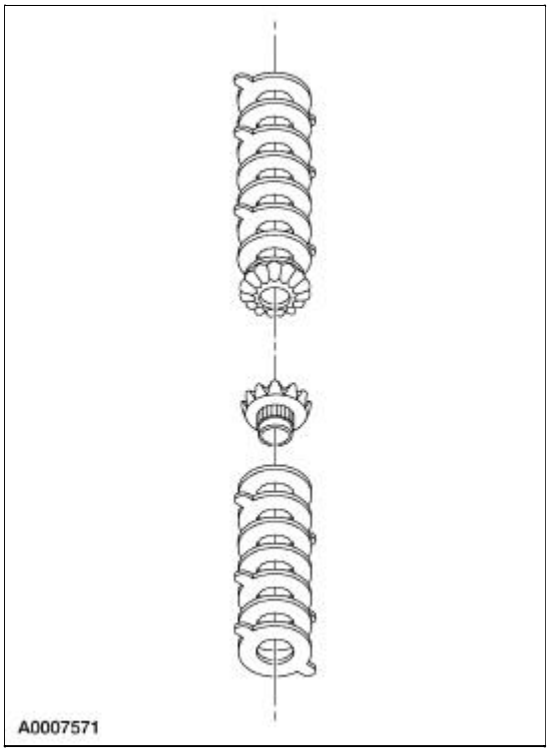
   Lubricate each steel clutch plate and soak all friction plates for no less than 15 minutes.

   - Use Additive Friction Modifier C8AZ-19B546-A or equivalent meeting Ford specification EST-M2C118-A

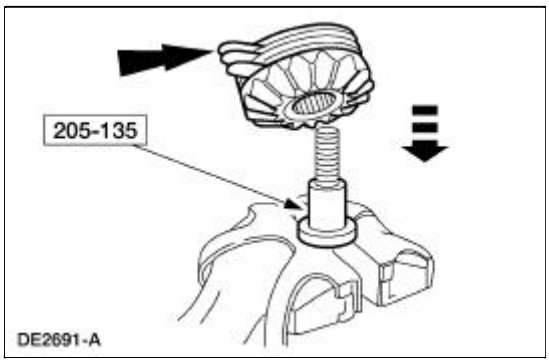


2. **CAUTION: Do not mix the differential clutch packs or shims from one side with the other.**

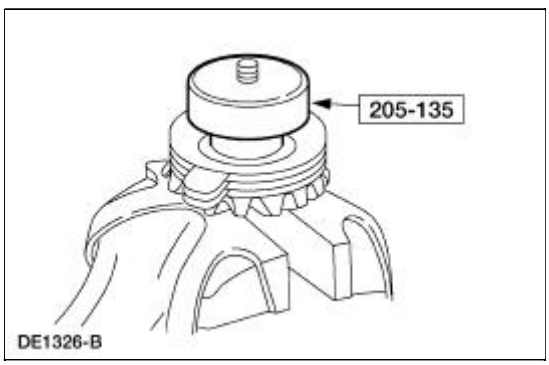
   Assemble the differential clutch packs (without the shims) on their respective differential side gears.



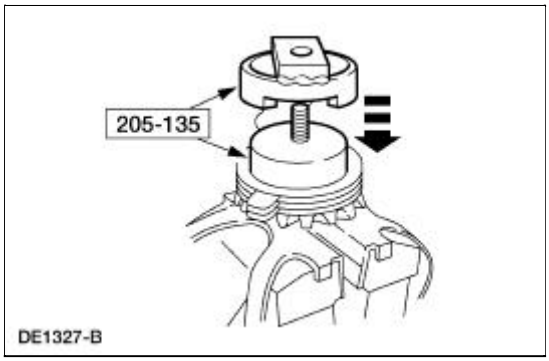
3. Place the base portion of the special tool in a vise. Install the differential differential side gear and differential clutch pack (without the shim) on the tool.



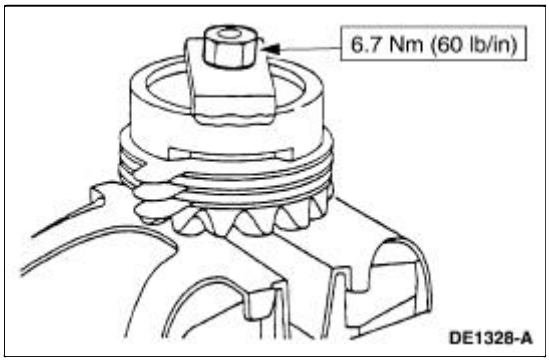
4. Position the special tool hand-tight on top of the differential clutch pack.



5. Install the special tool over the disc and differential clutch pack.



6. Install the nut.

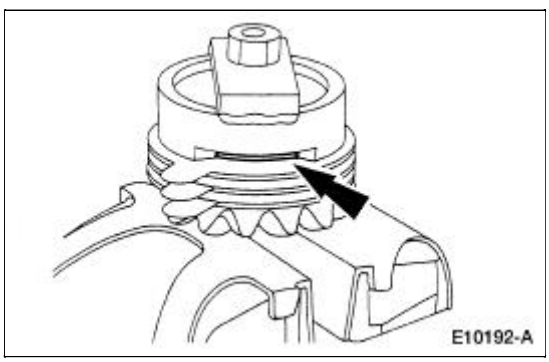


7. **NOTE:** Clutch Pack Rebuild Kit F5AZ-4947-A is available for this application.

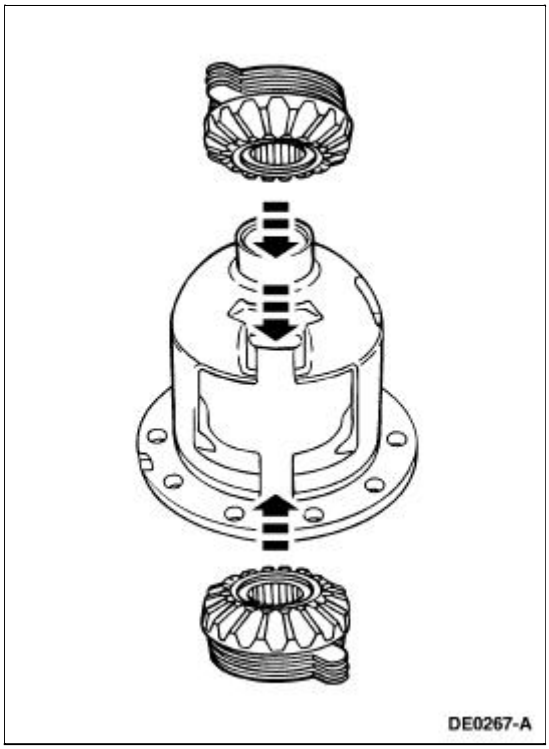
   Select and insert the thickest feeler gauge blade that will enter between the tool and the differential clutch pack. The reading will be the thickness of the new clutch shim.

   Selective Shims

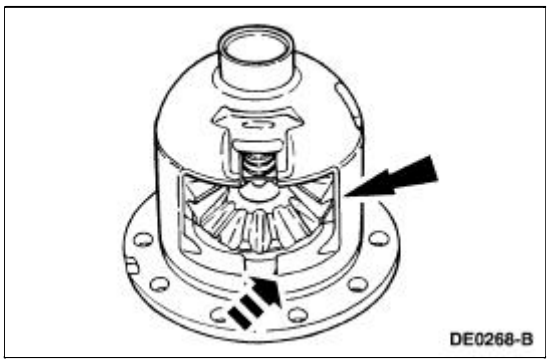
Part Number	Description
EOAZ-4A324-G	0.025 Inch
EOAZ-4A324-H	0.030 Inch
EOAZ-4A324-C	0.035 Inch
EOAZ-4A324-D	0.040 Inch
EOAZ-4A324-F	0.045 Inch



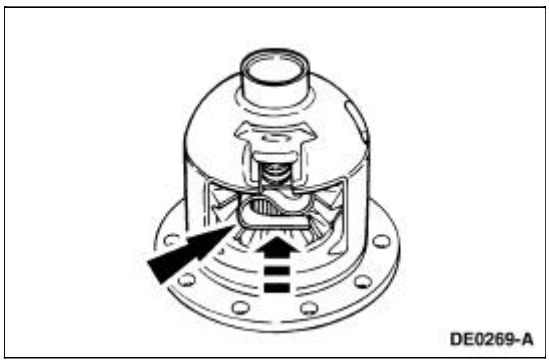
8. Remove the special tools from the differential clutch pack and differential side gear assembly.
9. Install shim(s) on the differential clutch pack and differential side gear assembly.
10. Install the differential side gear assemblies in the differential case.



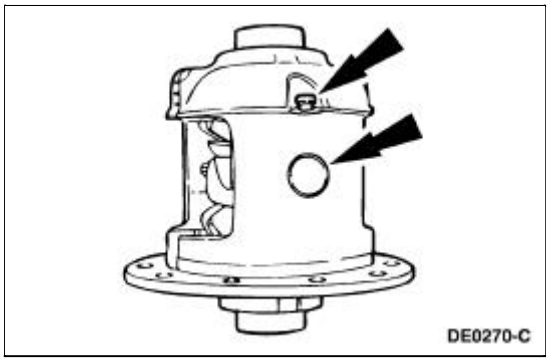
11. Install the differential pinion gear and differential pinion thrust washer assemblies in the differential case.



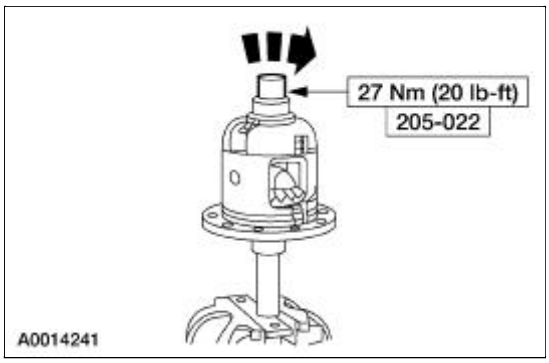
12. Using a soft-faced hammer, install the differential clutch spring.



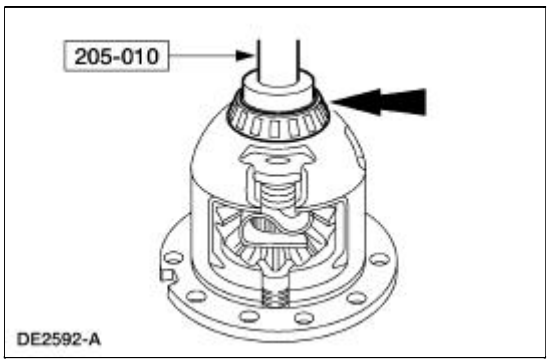
13. Install the differential pinion shaft and install a new bolt finger-tight.



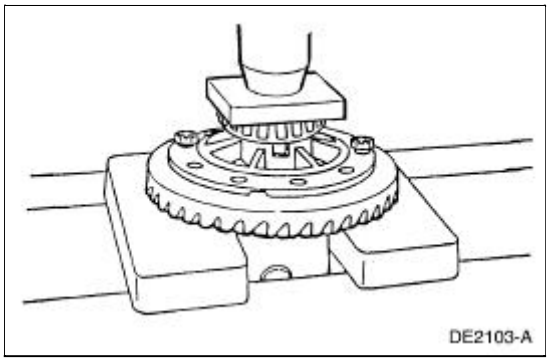
14. Mount the differential case and the special tool in a vise. Using the special tool, check the torque necessary to rotate one differential side gear.
    - If reusing the original clutch plates, the initial minimum break-away torque must be no less than the specification. The minimum rotating torque necessary to keep the differential side gear turning with new clutch plates may vary.



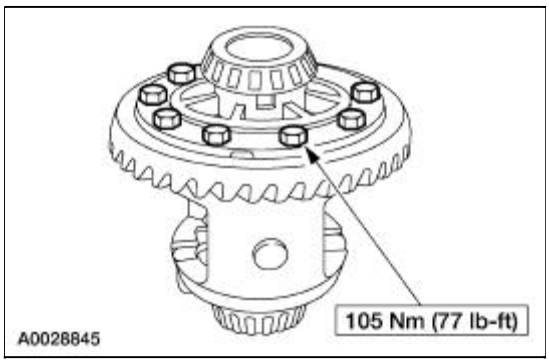
15. Using the special tool, install the differential bearings, if removed.



16. Position the differential ring gear and the differential case. Align the bolt holes by starting two bolts through the holes in the differential case and the differential ring gear. Press the differential ring gear on the differential case.



17. Install the bolts.
    - Apply Stud and Bearing Mount EOAZ-19554-BA or equivalent meeting Ford specification WSK-M2G349-A1 to the bolt threads.



18. Install the differential assembly in the differential housing. For additional information, refer to Differential Case in this section.

General Specifications

Item	Specification
Lubricants/Adhesive/Sealants	
Premium Long-Life Grease XG-1-C	ESA-M1C75-B
SAE 75W-140 High Performance Rear Axle Lubricant F1TZ-19580-B	WSL-M2C192-A
Additive Friction Modifier C8AZ-19B546-A	EST-M2C118-A
Clear Silicone Rubber F7AZ-19554-CA	ESB-M4G92-A
Stud and Bearing Mount EOAZ-19554-BA	WSK-M2G349-A1
Threadlock and Sealer EOAZ-19554-AA	WSK-M2G351-A5
High Temperature Nickel Anti-Seize Lubricant F6AZ-9L494-AA	ESE-M12A4-A
Capacity	
Additive Friction Modifier	118 ml (4 oz)
Rear axle lubricant	1.23-1.37 liters (2.6-2.9 pints)
Rear axle lubricant level	6.35 mm (1/4 inch) from the bottom of the fill hole
Clearance, Tolerance and Adjustments	
Maximum carrier spread	0.762 mm (0.030 in)
Maximum differential ring gear backface runout	0.076 mm (0.003 in)
Maximum differential case runout	0.076 mm (0.003 in)
Backlash between differential ring gear and pinion teeth	0.203 mm (0.008 in)-0.330 mm (0.013 in)
Preferred backlash	0.254 mm (0.010 in)
Maximum backlash variation between teeth	0.1016 mm (0.004 in)
Maximum radial runout of rear axle pinion flange in assembly TIR	0.254 mm (0.010 in)
Available drive pinion bearing adjustment shim in steps of: 0.0254 mm (0.001 in)	0.254 mm (0.010 in)-0.965 mm (0.038 in)
Lubricant deflector to differential housing cover	5.08 mm (0.200 in)-6.35 mm (0.250 in)

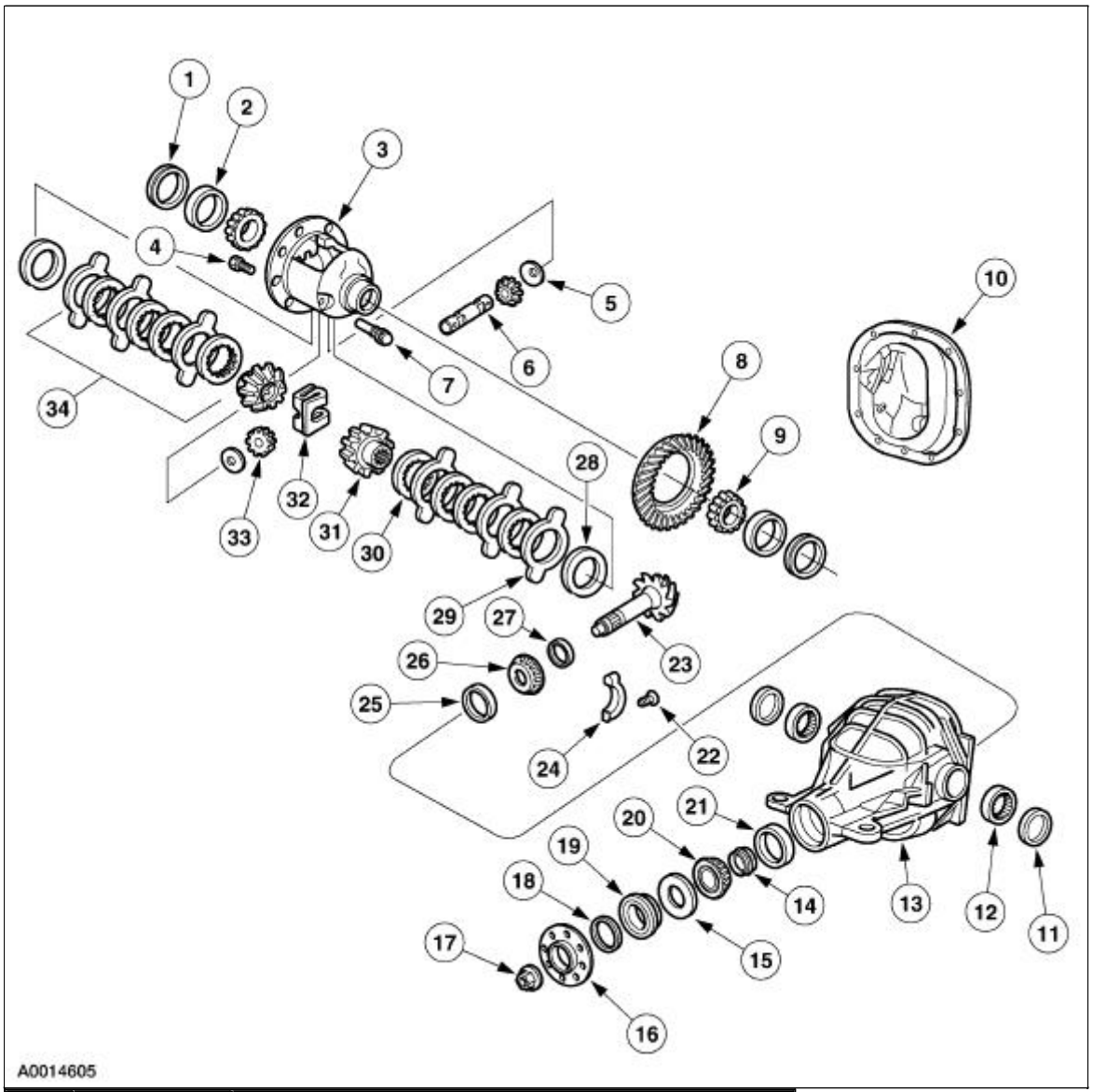
Torque Specifications

Description	Nm	lb-ft	lb-in
Rear axle wheel hub retainer	340	251	—
Driveshaft to pinion flange bolt	112	83	—
Rear axle differential front lower insulator nut and bolt	70	52	—
Rear axle differential rear insulator bolt	103	76	—

Pinion nose crossmember nut	250	184	—
Toe link nut	47	35	—
Shock absorber to lower suspension arm and bushing	133	98	—
Knuckle to lower suspension arm and bushing	115	85	—
Knuckle to upper suspension arm and bushing	90	66	—
Filler plug	34	25	—
Ring gear bolt [a]	105	77	—
Differential pinion shaft lock bolt	30	22	—
Bearing cap bolt	105	77	—
Differential housing cover bolt	32	24	—
Pinion bearing preload — (drive pinion collapsible spacer) used bearings [b]	0.9-1.16	—	8-14
New pinion bearings	1.8-3.2	—	16-29
Traction-Lok® clutch gauge nut	6.7	—	60
Initial minimum breakaway torque	27	20	—

[a] Use Stud and Bearing Mount EOAZ-19554-BA or equivalent meeting Ford specification WSK-M2G349-A1.
[b] With pinion flange yoke seal.

Rear Drive Axle and Differential



Item	Part Number	Description
1	4067	Differential bearing shim
2	4222	Differential bearing cup
3	4204	Differential case
4	4216	Differential ring gear case bolt
5	4230	Differential pinion thrust washer
6	4211	Differential pinion shaft
7	4241	Differential pinion shaft lock bolt
8	—	Differential ring gear (part of 4209)
9	4221	Differential bearing

10	4033	Differential housing cover
11	4B416	Inboard CV joint stub shaft pilot bearing housing seal
12	4B413	Inboard CV joint stub shaft pilot bearing
13	4010	Differential housing
14	4662	Differential drive pinion collapsible spacer
15	4670	Rear axle drive pinion shaft oil slinger
16	4851	Rear axle pinion flange
17	389546-S100	Pinion nut
18	4859	Drive pinion oil seal deflector
19	4676	Rear axle drive pinion seal
20	4621	Pinion bearing
21	4616	Differential drive pinion bearing cup
22	56187-S	Bolt
23	—	Drive pinion gear (part of 4209)
24	—	Differential bearing cap (part of 4010)
25	4628	Rear axle pinion bearing cup
26	4630	Pinion bearing
27	4663	Drive pinion bearing adjustment shim
28	4A321	Rear axle differential clutch shim
29	—	Clutch plate (part of 4947)
30	—	Clutch disc (part of 4947)
31	4236	Differential side gear
32	4214	Differential clutch spring
33	4215	Differential pinion gear
34	4947	Differential clutch pack

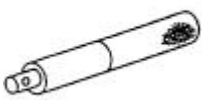
- The differential housing (4010) consists of a cast aluminum housing and a cast aluminum differential housing cover (4033). The differential housing cover uses silicone sealant as a gasket.
- The hypoid-design gearset consists of a 8.8-inch differential ring gear and a drive pinion gear. Two opposed pinion bearings (4621) (4630) support the drive pinion gear in the differential housing.
- A differential drive pinion collapsible spacer (4662), located on the drive pinion gear shaft, maintains pinion bearing preload. The pinion nut adjusts the preload.
- Differential bearing shims (4067), located between the differential bearing cups (4222) and the differential housing, adjust the differential ring gear backlash and the differential bearing preload.
- The differential case (4204) is a one-piece design with two openings to allow for assembly of the internal components and lubricant flow. Two opposed differential bearings (4221) support the differential case in the differential housing. Removable differential bearing caps retain the differential assembly in the differential housing.
- Inside the differential case, the differential pinion shaft (4211) supports two differential pinion gears (4215). The pinion gears engage the differential side gears (4236), to which the halfshafts

are splined. The differential pinion shaft lock bolt retains the differential pinion shaft in the differential case.

- A circlip, located on the inboard CV joint stub shaft, holds the halfshaft in the differential case. When installed, the circlip engages a groove in the differential side gear.
- The rear axle uses SAE 75W-140 High Performance Rear Axle Lubricant F1TZ-19580-B or equivalent meeting Ford specification WSL-M2C192-A.
- An embossed metal tag, bolted to the differential housing cover, contains rear axle identification. For additional information, refer to Section 205-00 .

Stub Shaft Pilot Bearing and Seal

Special Tool(s)

ST1200-A	Remover, Bearing Cup 308-047 (T77F-1102-A)
ST2577-A	Protector, Differential Seal (Pair) 205-461
ST1676-A	Installer, Differential Oil Seal 205-293 (T89P-4850-A)
 ST1326-A	Adapter for 303-224 (Handle) 205-153 (T80T-4000-W)
ST1185-A	Slide Hammer 100-001 (T50T-100-A)
ST1721-A	Installer, Needle Bearing 205-288 (T89P-1244-A)

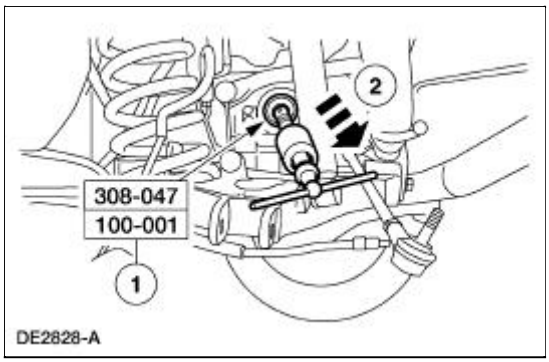
Removal

1. Remove the halfshaft assembly.
   - The knuckle and halfshaft are removable as an assembly. For additional information, refer to Axle Housing in this section. If it is necessary to remove the halfshaft from the knuckle, refer to Section 205-05 .
2. **NOTE:** If only removing the inboard CV joint stub shaft pilot bearing housing seal (4B416),

engage the tangs of the special tool only on the seal.

Using the special tools, remove the inboard CV joint stub shaft pilot bearing housing seal and the inboard CV joint stub shaft pilot bearing (4B413).

1. Firmly engage the tangs of the special tool on the bearing.
2. Remove the bearing and the seal.



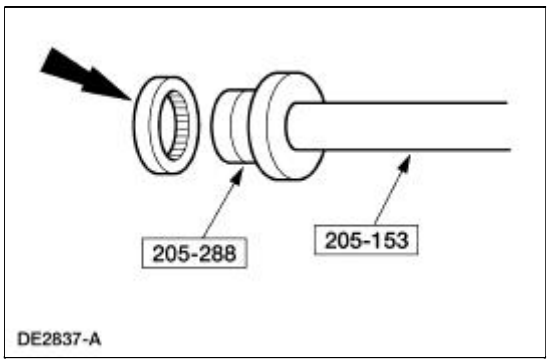
Installation

1. Inspect the seal journal for rust, nicks and scratches. Polish the seal journal with fine crocus cloth, if necessary.

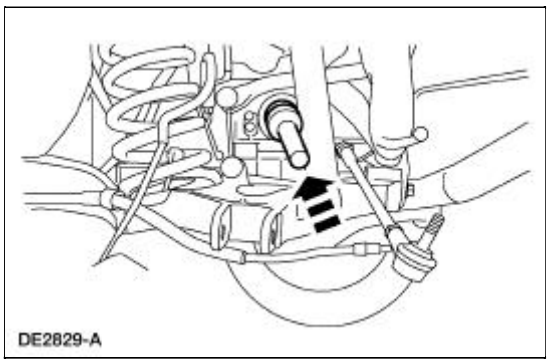
2. Lubricate the new inboard CV joint stub shaft pilot bearing.
   - Use SAE 75W-140 High Performance Rear Axle Lubricant F1TZ-19580-B or equivalent meeting Ford specification WSL-M2C192-A.

3. **CAUTION: Installation without the correct tools can result in early bearing failure.**

   Place the inboard CV joint stub shaft pilot bearing onto the special tools.



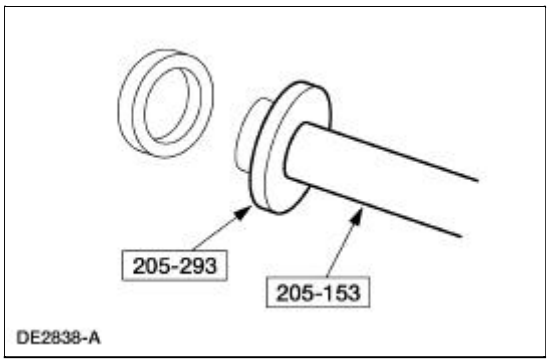
4. Install the inboard CV joint stub shaft pilot bearing.



5. Lubricate the lip of the new inboard CV joint stub shaft pilot bearing housing seal.
    - Use Premium Long-Life Grease XG-1-C or equivalent meeting Ford specification ESA-M1C75-B.

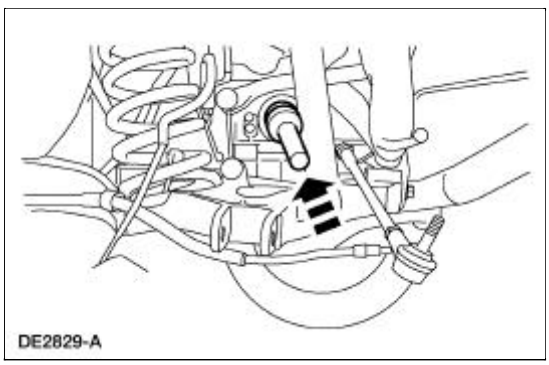
6. **CAUTION: Installation without the correct tools can result in early seal failure.**

    Place the inboard CV joint stub shaft pilot bearing housing seal onto the special tools.



7. **CAUTION: If the inboard CV joint stub shaft pilot bearing housing seal becomes misaligned in the bore during installation, remove it and install a new one.**

    Carefully align the inboard CV joint stub shaft pilot bearing housing seal in the housing bore and install the seal.



8. **CAUTION: Use special tool 205-461 to avoid damaging the new inboard CV joint stub shaft pilot bearing housing seal when installing the halfshaft.**

    Install the halfshaft.
    - If the knuckle and halfshaft were removed as an assembly, refer to Axle Housing in this section. If the halfshaft was removed from the knuckle, refer to Section 205-05 .

Drive Pinion Flange

Special Tool(s)

ST2026-A	2-Jaw Puller 205-D072 (D97L-4221-A) or equivalent
ST1257-A	Holding Fixture, Drive Pinion Flange 205-126 (T78P-4851-A)
ST1862-A	Installer, Drive Pinion Flange 205-002 (TOOL-4858-E) or equivalent

Removal

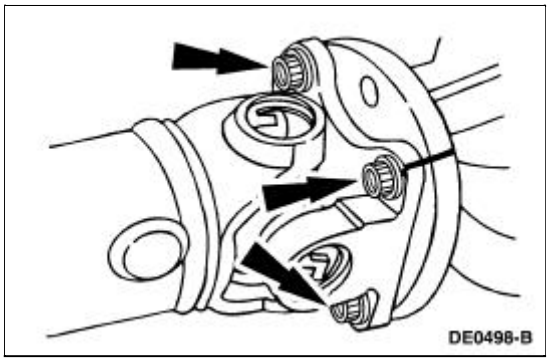
1. Raise and support the vehicle. For additional information, refer to Section 100-02 .
2. Remove the rear wheel and tire assemblies. For additional information, refer to Section 204-04 .
3. **CAUTION: Remove the rear brake calipers to prevent drag during the drive pinion bearing preload adjustment.**

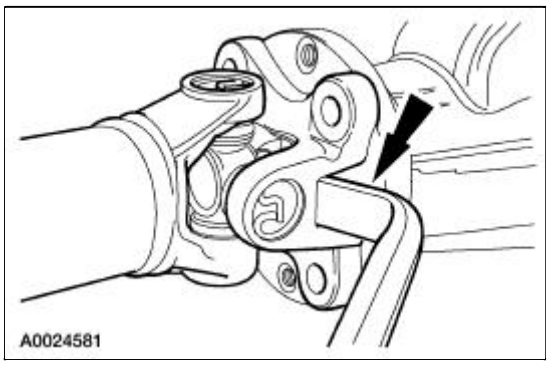
   CAUTION: Do not allow the calipers to hang from the brake hoses.

   Remove the rear brake caliper and support bracket from the knuckle as an assembly. Wire the caliper and support bracket assembly out of the way. For additional information, refer to Section 206-04 .
4. **CAUTION: Index-mark the driveshaft flange and rear axle pinion flange (4851) to maintain initial balance during installation.**

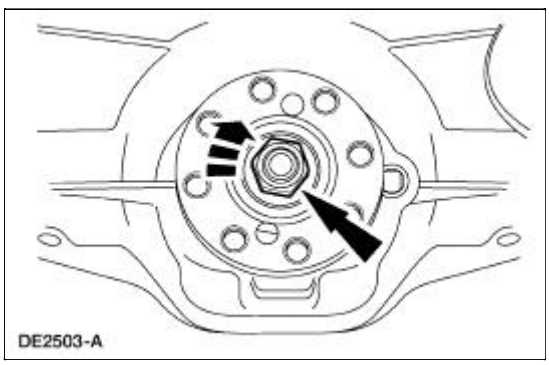
   CAUTION: The driveshaft centering socket yoke fits tightly on the rear axle pinion flange pilot. Never hammer on the driveshaft (4602) or any of its components to disconnect the yoke from the flange. Pry only in the area shown, with a suitable tool, to disconnect the yoke from the flange.

   Disconnect and position the driveshaft out of the way. For additional information, refer to Section 205-01 .



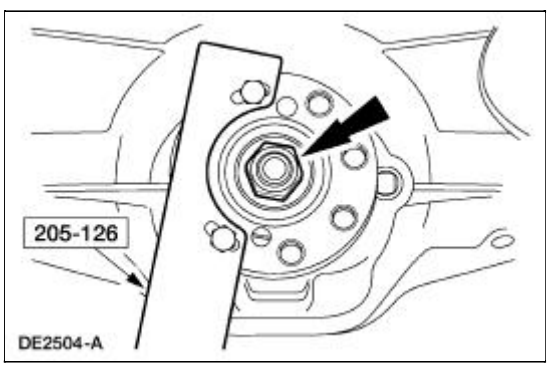


5. Install an Nm (inch/pound) torque wrench on the nut and record the torque necessary to maintain rotation of the drive pinion gear through several revolutions.

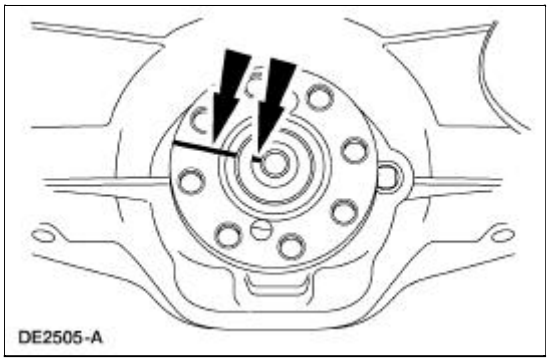


6. **CAUTION: After removing the nut, discard it. Use a new nut for installation.**

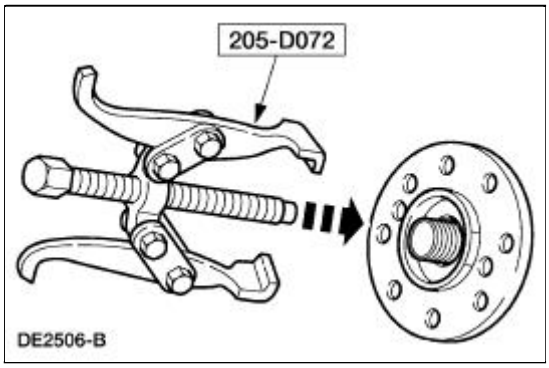
   Use the special tool to hold the rear axle pinion flange while removing the nut.



7. Index-mark the rear axle pinion flange and drive pinion gear stem to maintain initial balance during installation.



8. Using the special tool, remove the rear axle pinion flange.



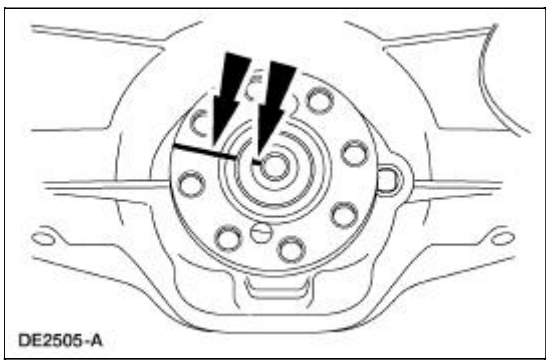
Installation

1. Inspect the rear axle pinion flange seal journal for rust, nicks, and scratches prior to installing the flange. Polish the seal journal with fine crocus cloth, if necessary.

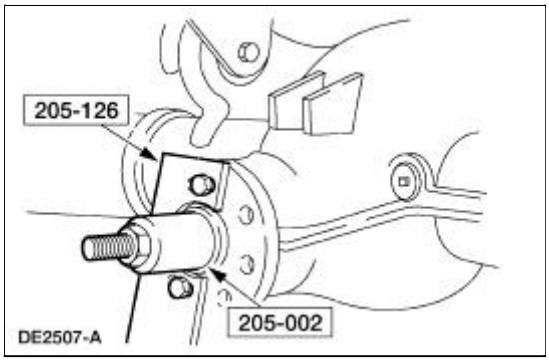
2. Lubricate the rear axle pinion flange splines.
   - Use SAE 75W-140 High Performance Rear Axle Lubricant F1TZ-19580-B or equivalent meeting Ford specification WSL-M2C192-A.

3. **NOTE:** Disregard the index marks if installing a new rear axle pinion flange.

   Position the rear axle pinion flange.



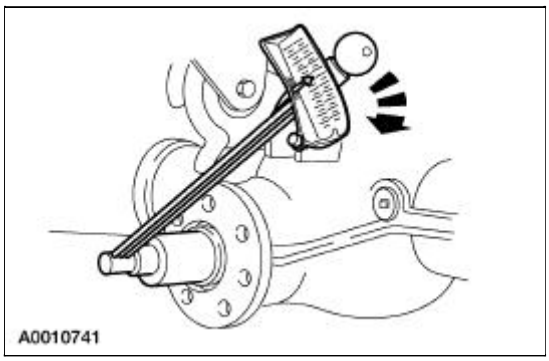
4. Using the special tools, install the rear axle pinion flange.



5. **CAUTION: Do not under any circumstance loosen the nut to reduce preload. If it is necessary to reduce preload, install a new differential drive pinion collapsible spacer (4662) and nut.**

   Tighten the nut to set the preload.

   - Rotate the pinion occasionally to make sure the pinion bearings (4630) (4621) seat correctly. Take frequent pinion bearing torque preload readings by rotating the drive pinion gear with a Nm (inch/pound) torque wrench.
   - If the preload recorded prior to disassembly is lower than the specification for used bearings, then tighten the nut to specification. If the preload recorded prior to disassembly is higher than the specification for used bearings, then tighten the nut to the original reading as recorded.
   - Refer to the torque specification for used pinion bearings in the Specifications portion of this section.

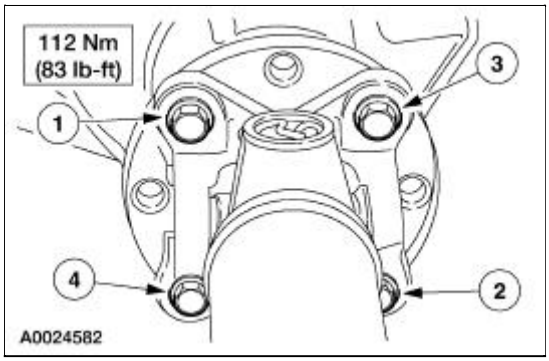


6. **CAUTION: Align the index-marks.**

   CAUTION: Install the driveshaft with new bolts. If new bolts are not available, apply Threadlock and Sealer EOAZ-19554-AA or equivalent meeting Ford specification WSK-M2G351-A5 to the threads of the original bolts.

   CAUTION: The driveshaft centering socket yoke fits tightly on the rear axle pinion flange pilot. To make sure that the yoke seats squarely on the flange, tighten the bolts evenly in a cross pattern as shown.

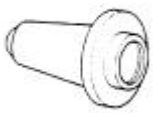
   Connect the driveshaft. For additional information, refer to Section 205-01 .



7. Install the rear brake calipers. For additional information, refer to Section 206-04 .
8. Install the rear wheel and tire assemblies. For additional information, refer to Section 204-04 .
9. Lower the vehicle.

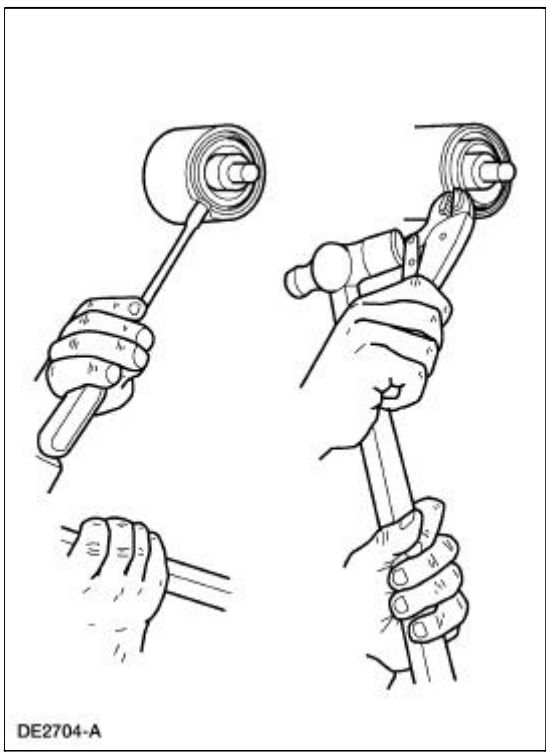
Pinion Seal

Special Tool(s)

 ST1325-A	Installer, Drive Pinion Oil Seal 205-133 (T79P-4676-A)

Removal

1. Remove the pinion flange (4851). For additional information, refer to Drive Pinion Flange in this section.
2. Force up the metal flange of the rear axle drive pinion seal (4676).
   - Install gripping pliers and strike with a hammer to remove the seal.

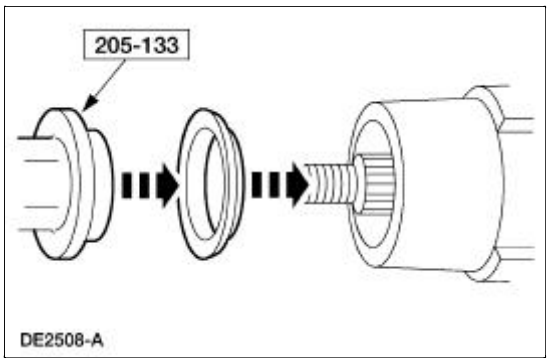

DE2704-A

Installation

1. Lubricate the new rear axle drive pinion seal.
   - Use Premium Long-Life Grease XG-1-C or equivalent meeting Ford specification ESA-M1C75-B.
2. **CAUTION: Installation without the proper tool can result in early seal failure.**

CAUTION: If the rear axle drive pinion seal becomes misaligned during installation, remove it and install a new one.

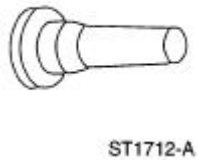
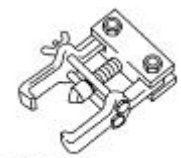
Using the special tool, install the rear axle drive pinion seal.



3. Install the pinion flange. For additional information, refer to Drive Pinion Flange in this section.

Axle Housing

Special Tool(s)

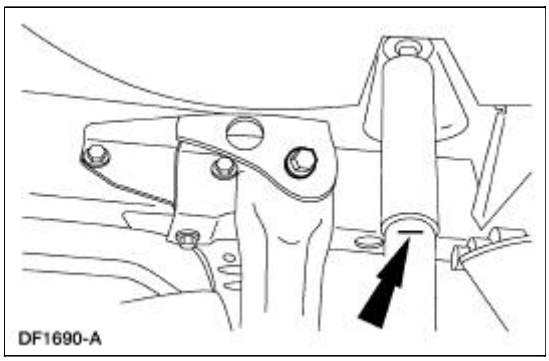
 ST1712-A	Plug Set, Differential 205-294 (T89P-4850-B)
ST2577-A	Protector, Differential Seal (Pair) 205-461
ST2309-A	Remover, Halfshaft 205-475
 ST2273-A	Remover, Steering Arm 211-003 (T64P-3590-F)

Removal

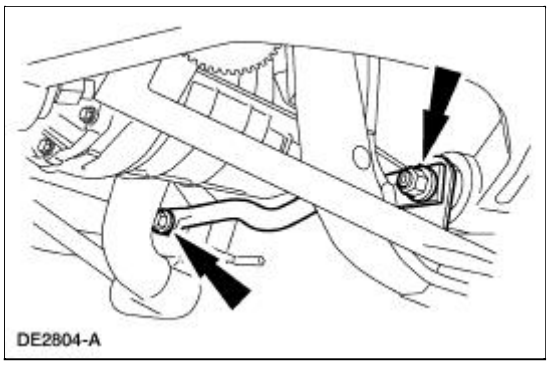
1. **CAUTION: The vehicle must be on level ground and at curb height.**

   Mark the rear shock absorbers relative to their protective sleeve.

   - During installation, raise the suspension to this reference mark before tightening the suspension component fasteners.


DF1690-A

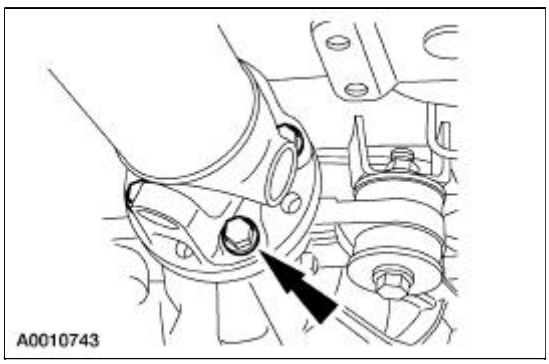
2. Raise and support the vehicle. For additional information, refer to Section 100-02 .
3. Remove the rear wheel and tire assemblies. For additional information, refer to Section 204-04 .
4. Remove the exhaust system. For additional information, refer to Section 309-00 .
5. Remove the pinion nose crossmember.

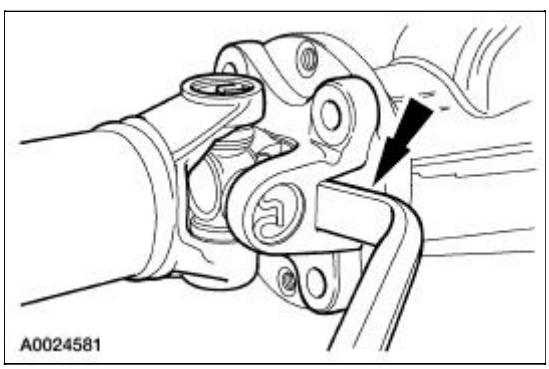


6. **CAUTION: Index-mark the driveshaft flange and rear axle pinion flange (4851) to maintain initial balance during installation.**

   CAUTION: The driveshaft centering socket yoke fits tightly on the rear axle pinion flange pilot. Never hammer on the driveshaft (4602) or any of its components to disconnect the yoke from the flange. Pry only in the area shown, with a suitable tool, to disconnect the yoke from the flange.

   Disconnect and position the driveshaft out of the way.

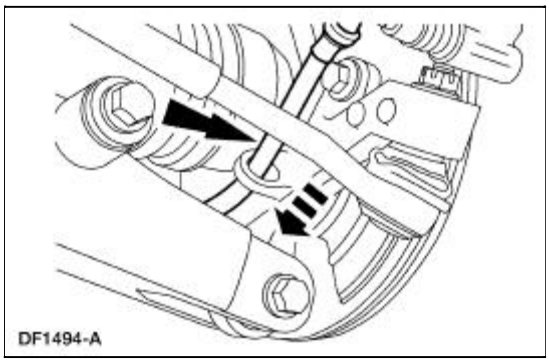




7. **NOTE:** The following halfshaft and knuckle assembly removal steps apply to both sides of the vehicle.

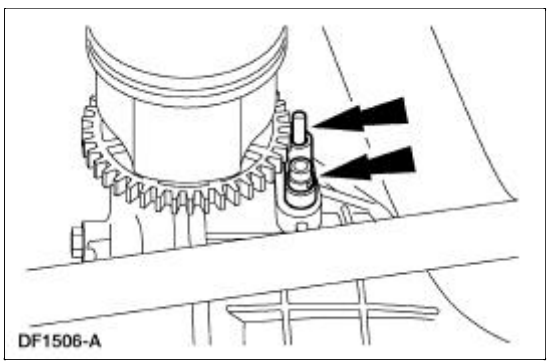
Disconnect the parking brake cable and conduit from the parking brake lever and the caliper. For additional information, refer to Section 206-05 .

8. Separate the parking brake cable and conduit from the knuckle.



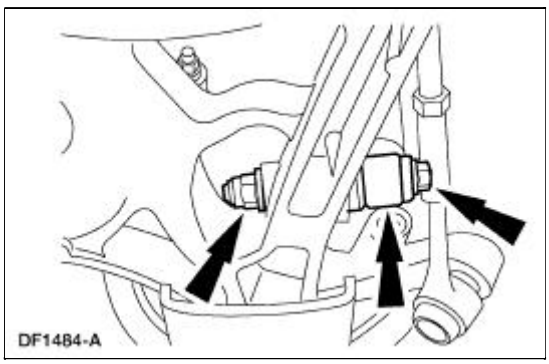
9. Remove the rear brake disc. For additional information, refer to Section 206-04 .
   - Remove the rear brake caliper and support bracket from the knuckle as an assembly. Wire the caliper and support bracket assembly out of the way.

10. Remove the rear brake anti-lock sensor and position it aside.

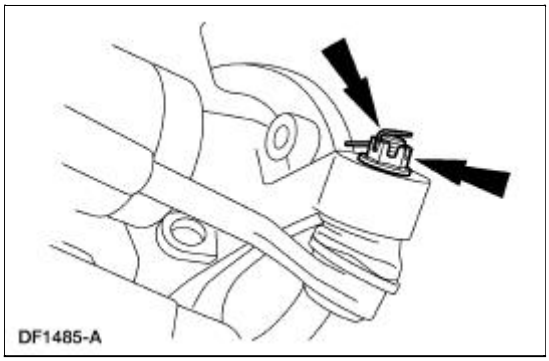


11. Support the lower suspension arm and bushing with a jack stand.

12. Remove and discard the nut and bolt.

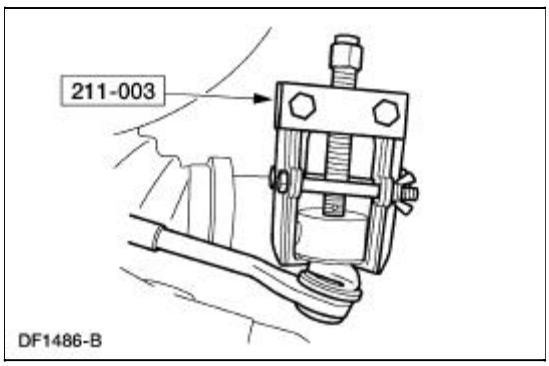


13. Remove and discard the cotter pin and nut.



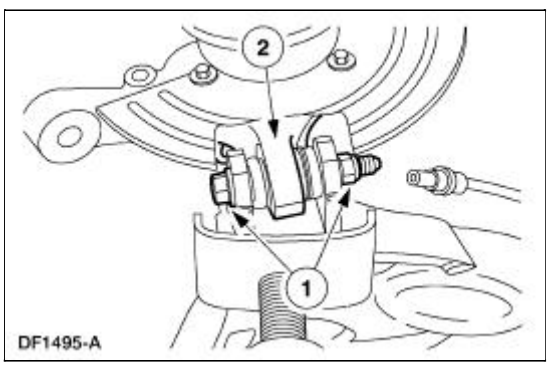
14. **CAUTION: Do not strike the toe link or the knuckle to disconnect the toe link from the knuckle.**

    Using the special tool, disconnect the toe link from the knuckle.



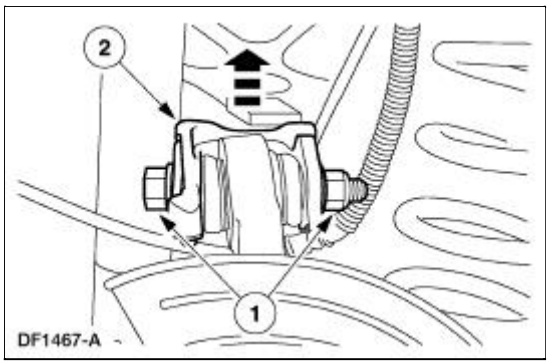
15. Mark the cam bolt position relative to the upper suspension arm and bushing.

16. Disconnect the knuckle from the lower suspension arm and bushing.
    1. Remove and discard the nut and bolt.
    2. Disconnect the knuckle from the lower suspension arm and bushing.



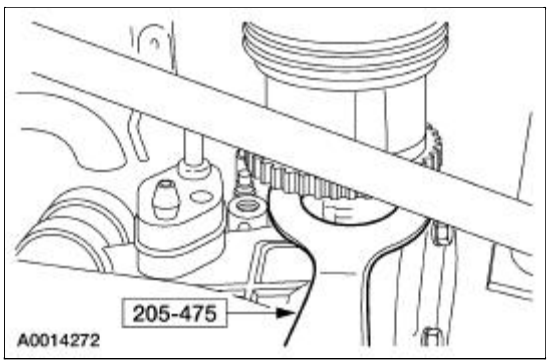
17. **NOTE:** Mark the new cam bolt in the same position as the old one for assembly reference before discarding the old bolt.

    Disconnect the knuckle from upper suspension arm and bushing.
    1. Remove and discard the nut and bolt.
    2. Disconnect the knuckle from the upper suspension arm and bushing.

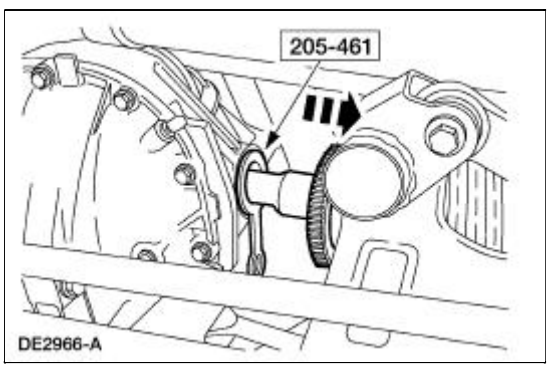


18. **CAUTION: The crown on the tool forks must face away from the differential housing. Position the special tool correctly between the CV joint and the differential housing so as not to damage the differential seal.**

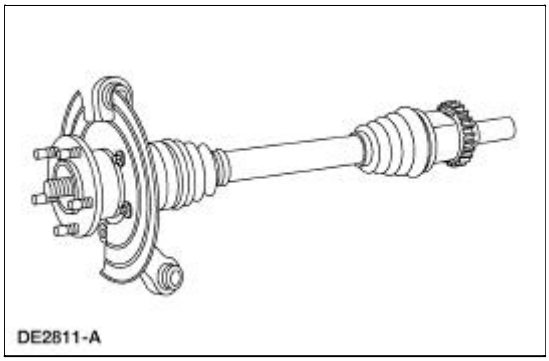
    Using the special tool, exert enough pressure to overcome the circlip and separate the CV joint from the differential side gear.



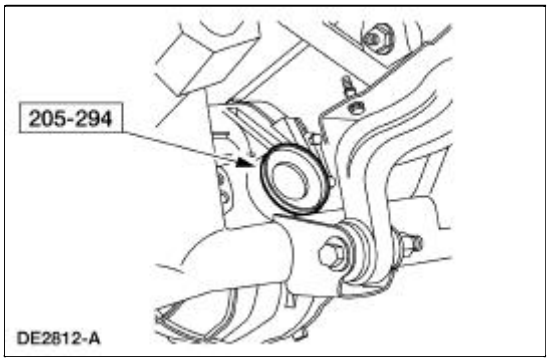
19. Install the special tool.



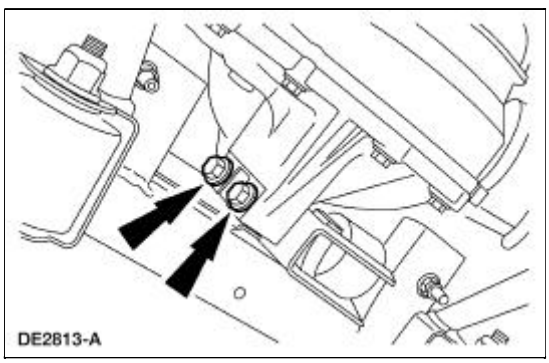
20. Remove the halfshaft and knuckle assembly from the vehicle.



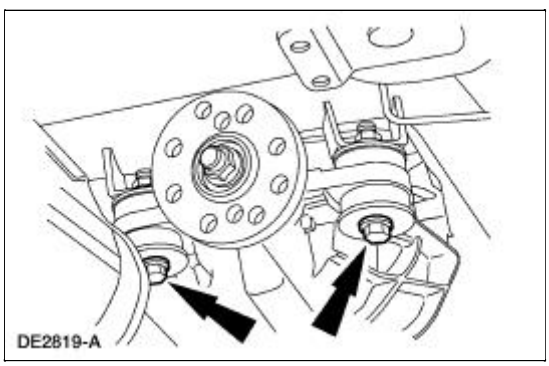
21. Insert the special tool into the housing bore.



22. Remove the other halfshaft and knuckle assembly as described in the previous steps.
23. Support the differential housing (4010) with a transmission jack.
24. Remove the bolts.



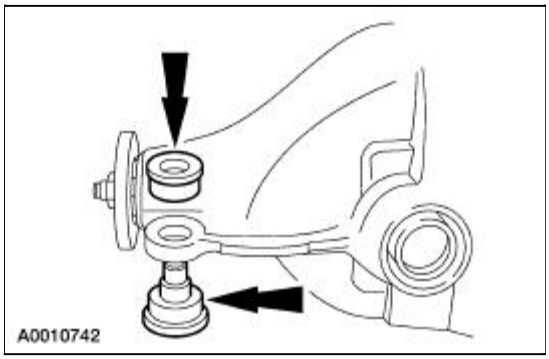
25. Remove the nuts and bolts.



26. **CAUTION: Do not damage the axle vent hose.**

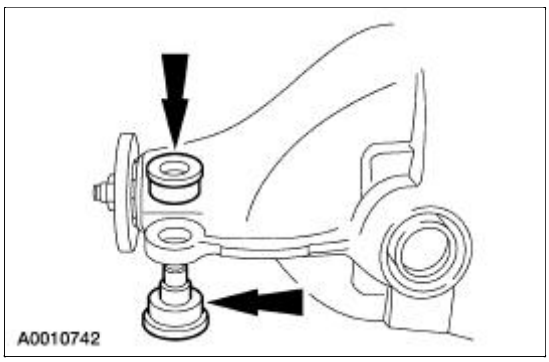
    Lower the rear axle assembly from the vehicle.

27. If removal of the mounting bushings is necessary, remove them by hand.

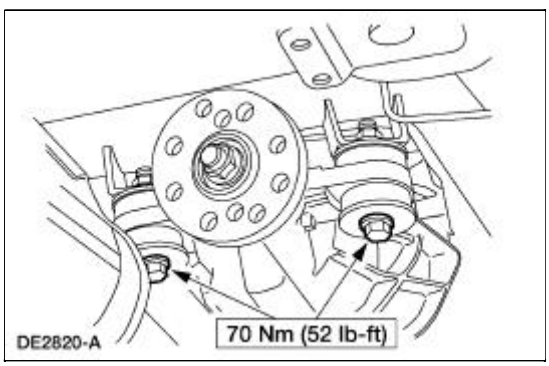


Installation

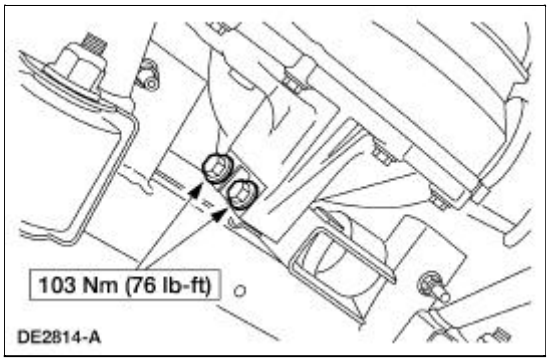
1. Install the bushings, if removed.



2. Using the transmission jack, raise the rear axle assembly into position.
3. Install the bolts and nuts.



4. Install the bolts.

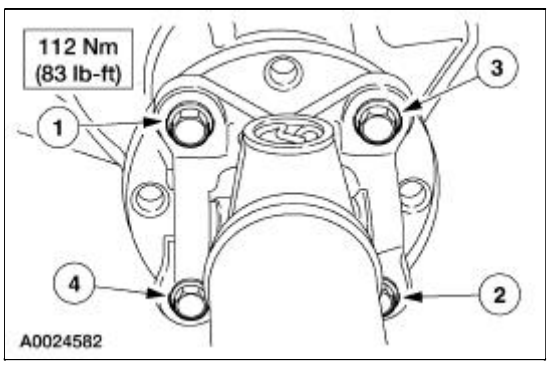


5. **CAUTION: Align the index-marks.**

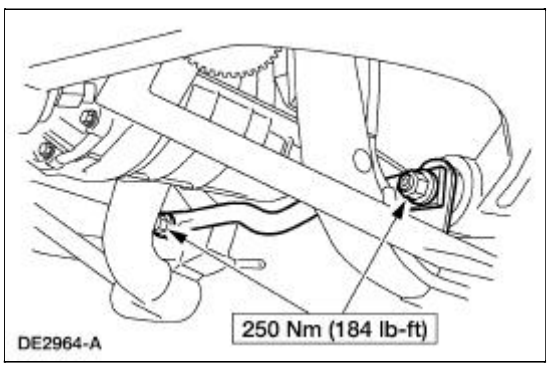
   CAUTION: Install the driveshaft with new bolts. If new bolts are not available, apply Threadlock and Sealer EOAZ-19554-AA or equivalent meeting Ford specification WSK-M2G351-A5 to the threads of the original bolts.

   CAUTION: The driveshaft centering socket yoke fits tightly on the rear axle pinion flange pilot. To make sure that the yoke seats squarely on the flange, tighten the bolts evenly in a cross pattern as shown.

   Connect the driveshaft and install the bolts.

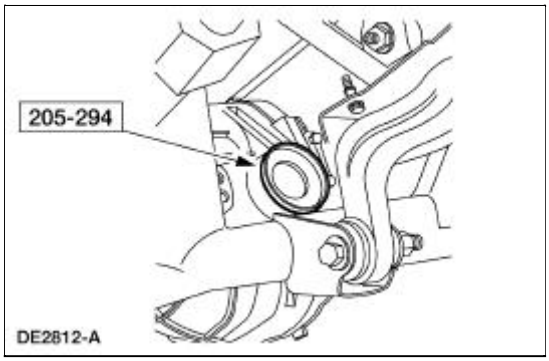


6. Install the pinion nose crossmember.



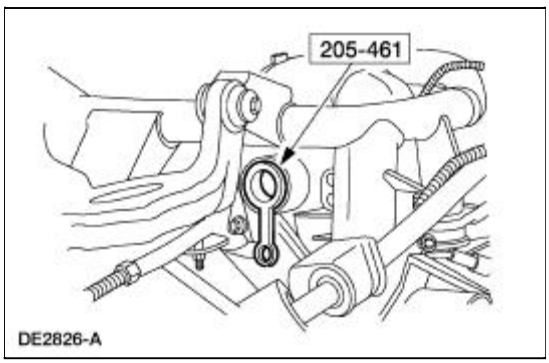
7. **NOTE:** The following halfshaft and knuckle assembly installation steps apply to both sides of the vehicle.

   Remove the special tool.

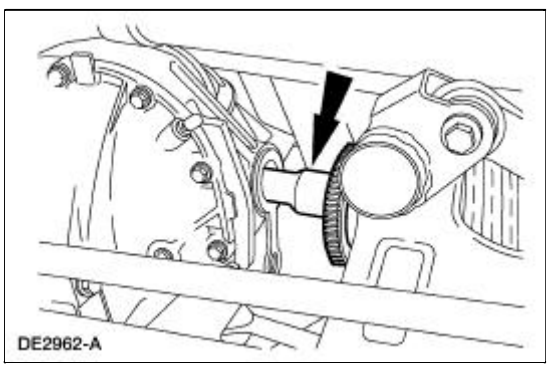


8. **CAUTION: Differential seal damage will occur if installing the halfshaft without the special tool.**

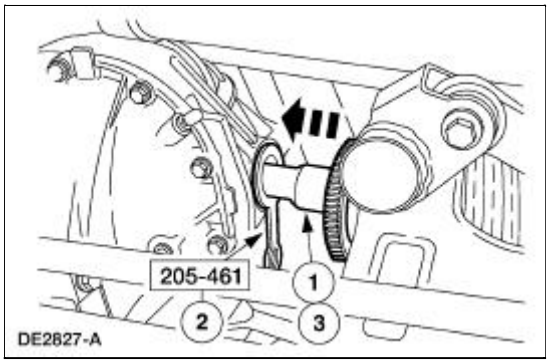
   Install the special tool.



9. Position the halfshaft for installation.

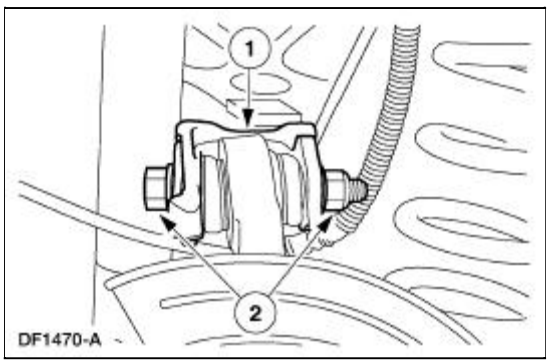


10. Seat the CV joint stub shaft in the differential side gear.
    1. Slide the stub shaft into the differential housing until the shaft splines are past the differential seal.
    2. Remove the special tool.
    3. Align the stub shaft splines and the side gear splines, and slide the stub shaft into the gear until it seats.
       - When seated, the axle circlip will lock the stub shaft in the differential side gear. Check the circlip engagement by attempting to pull the inboard CV joint out of the differential side gear. If the circlip has not seated, push the CV joint inward until the circlip is fully engaged in the differential side gear.



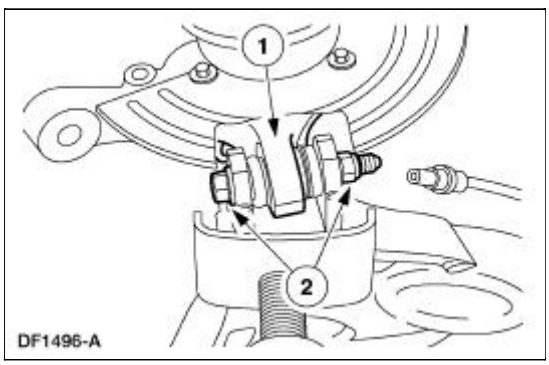
11. **CAUTION: Do not tighten the fastener at this time.**

Connect the knuckle to the upper suspension arm and bushing.
1. Position the knuckle.
2. Install the new cam bolt and nut.

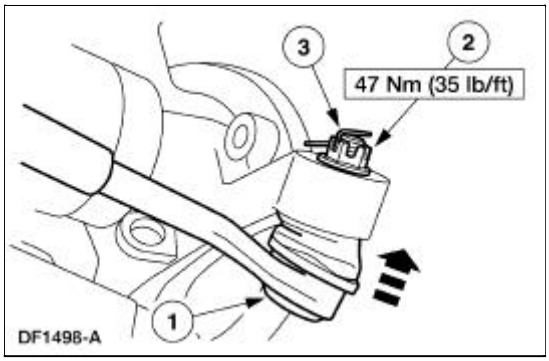


12. **CAUTION: Do not tighten the fastener at this time.**

Connect the knuckle to the lower suspension arm and bushing.
1. Position the knuckle.
2. Install the new bolt and nut.

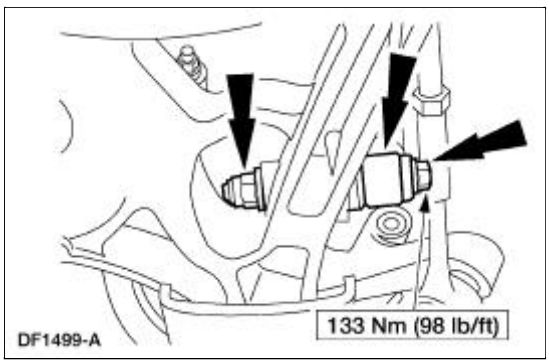


13. Connect the toe link to the knuckle.
1. Position the toe link.
2. Install the new nut.
3. Install the new cotter pin.



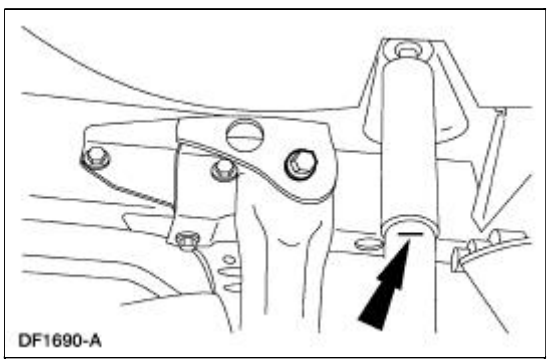
14. **CAUTION: Install the hardened washer between the lower suspension arm and bushing and the shock absorber. Failure to do so can result in damage and failure of the lower suspension arm and bushing.**

    Position the shock absorber, and install the bolt and the new nut.

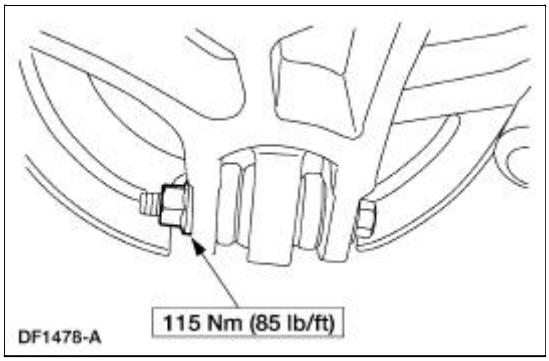


15. Install the other halfshaft and knuckle assembly, toe link, and shock absorber as described in the previous steps.

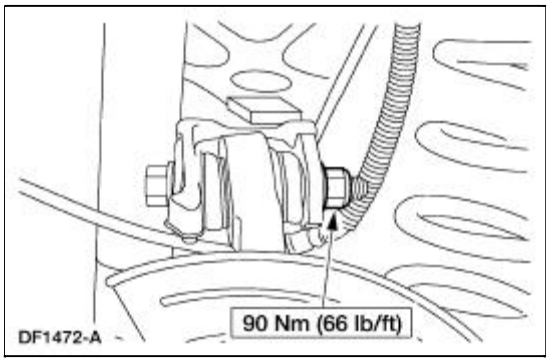
16. Raise the suspension until the shock absorbers compress to the previously established alignment mark (curb height).



17. Tighten the nut.



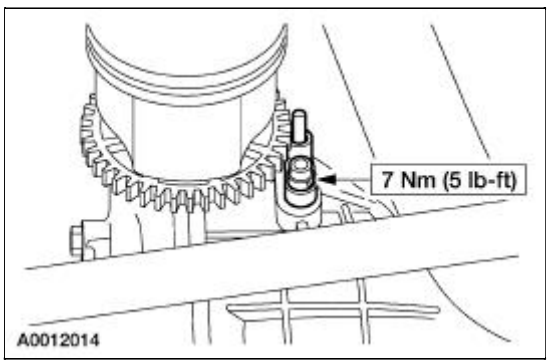
18. Align the marks on the cam bolt and the upper suspension arm and bushing, and tighten the nut.



19. Repeat the two previous steps for the other knuckle.

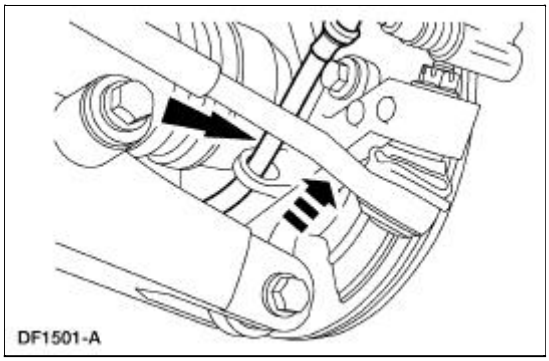
20. Lower the suspension and remove the jack stands.

21. Apply Anti-Seize Lubricant to the rear brake anti-lock sensors where they contact the axle housing and install the anti-lock sensors.
    - Use High Temperature Nickel Anti-Seize Lubricant F6AZ-9L494-AA or equivalent meeting Ford specification ESE-M12A4-A.



22. Install the brake disc, and the rear disc brake caliper and support bracket assembly. For additional information, refer to Section 206-04 .

23. Position the parking brake cable and conduit.



24. Connect the parking brake cable and conduit to the caliper and parking brake lever. For additional information, refer to Section 206-05 .

25. Repeat the three previous steps for the brake components on the other side of the vehicle.

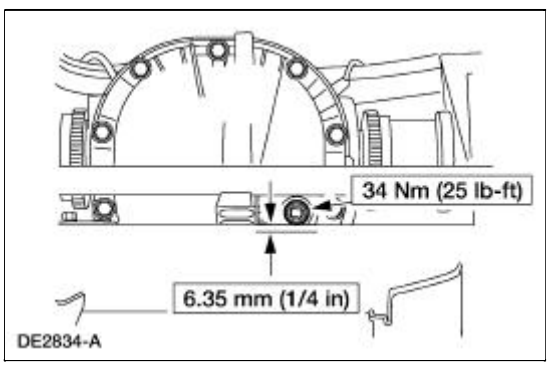
26. Install the exhaust system. For additional information, refer to Section 309-00 .

27. Install the wheels and tires. For additional information, refer to Section 204-04 .

28. **CAUTION: If refilling the rear axle (4001), first add 118 ml (4 oz) of Additive Friction Modifier C8AZ-19B546-A or equivalent meeting Ford specification EST-M2C118-A.**

    Check the lubricant level.

    - If necessary, fill the rear axle housing to the level shown with SAE 75W- 140 High Performance Rear Axle Lubricant F1TZ-19580-B or equivalent meeting Ford specification WSL-M2C192-A. The refill capacity is 1.23-1.37 liters (2.6-2.9 pints).

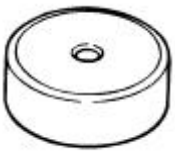
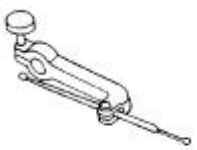


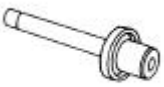
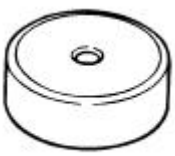
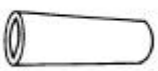
29. Lower the vehicle.

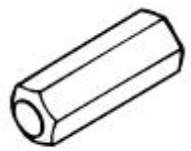
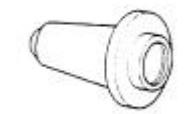
30. Check, and adjust the wheel alignment as necessary. For additional information, refer to Section 204-00 .

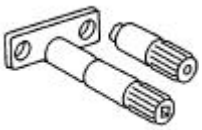
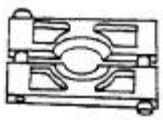
Axle

Special Tool(s)

ST2026-A	2-Jaw Puller 205-D072 (D97L-4221-A) or equivalent
 ST1743-A	Adapter for 205-S127 205-105 (T76P-4020-A3)
ST1165-A	Bearing Preload Tool 205-395 (T93P-4220-A)
ST1254-A	Plate, Bearing/Oil Seal 205-090 (T75L-1165-B)
 ST1348-A	Gauge, Clutch Housing 308-021 (T75L-4201-A)
ST1257-A	Holding Fixture, Drive Pinion Flange 205-126 (T78P-4851-A)
ST1724-A	Installer, Drive Pinion Flange 205-002 (TOOL-4858-E) or equivalent
	Dial Indicator Gauge 100-D005 (D78P-4201-G) or equivalent

ST1183-A	
ST1214-A	Dial Indicator Gauge with Holding Fixture 100-002 (TOOL-4201-C) or equivalent
ST1259-A	Spreader, Differential Carrier 205-001 (TOOL-4000-E) or equivalent
 ST1375-A	Installer, Differential Side Bearing 205-010 (T57L-4221-A2)
ST1431-A	Adapter for 205-S127 205-110 (T76P-4020-A10)
 ST1743-A	Adapter for 205-S127 205-129 (T79P-4020-A18)
 ST1434-A	Gauge Tube, Drive Pinion 205-336 (T93P-4020-A)
ST1432-A	Adapter for 205-S127 205-111 (T76P-4020-A11)
	Spreader, Differential Housing (Plate) 205-335 (T93P-4000-A)

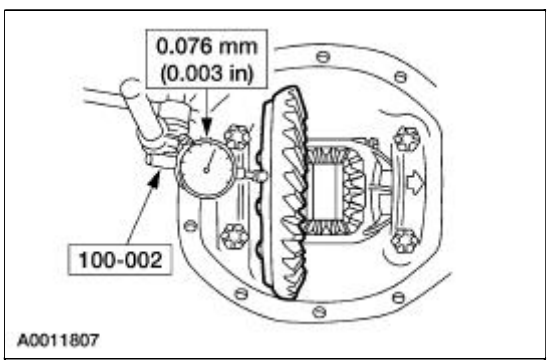
ST1344-A	
ST1349-A	Gauge, Differential Bearing 205-338 (T93P-4222-A)
ST1367-A	Installer, Drive Pinion Bearing Cone 205-005 (T53T-4621-C)
ST1678-A	Installer, Drive Pinion Bearing Cup 205-024 (T67P-4616-A)
 ST1744-A	Protector, Drive Pinion Thread 205-460
 ST1325-A	Installer, Drive Pinion Oil Seal 205-133 (T79P-4676-A)
ST1350-A	Gauge, Differential Bearing 205-339 (T93P-4222-B)
ST1429-A	Adapter for 205-S127 205-109 (T76P-4020-A9)
	Step Plate 205-D061 (D83T-4205-C2) or equivalent

ST1725-A	
ST1374-A	Gauge, Differential Clutch 205-135 (T80P-4946-A)
 ST1265-A	Gauge, Differential Clutch Torque 205-013 (T59L-4204-A)
 ST1310-A	Remover, Bearing 205-055 (T71P-4621-B)
ST1186-A	Holding Fixture, Transmission 307-003 (T57L-500-B)

Disassembly

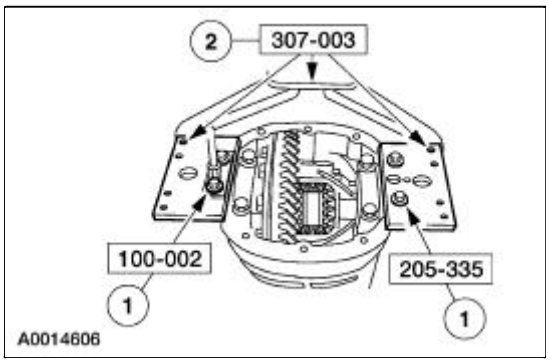
Initial disassembly

1. Remove the differential housing cover (4033) and drain the lubricant into a suitable container.
2. Wipe the lubricant from the internal working parts and inspect the parts for wear and damage.
3. Using the special tool, measure and note the differential ring gear backface runout.
    - Remove the special tool.

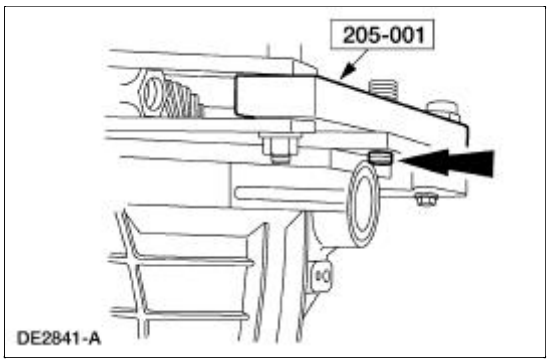


4. **CAUTION: Do not damage the aluminum differential housing (4010) while carrying out these procedures.**

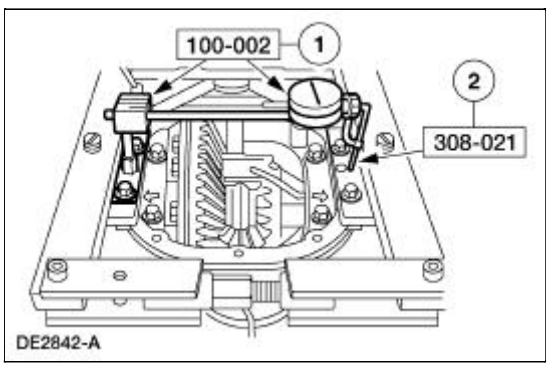
   Using the special tools, mount the differential housing to a work bench.
   1. Attach the special tools to the differential housing with four bolts that retain the differential housing cover to the differential housing.
   2. Attach the special tools together with two 3/8 inch x 1-1/2 inch bolts.



5. Install the special tool by placing the spreader pins in the hole in the Housing Spreader Adapters.



6. Assemble the special tool.
   1. Install the special tool.
   2. Attach the special tool and position the tip in the Housing Spreader Adapter hole.

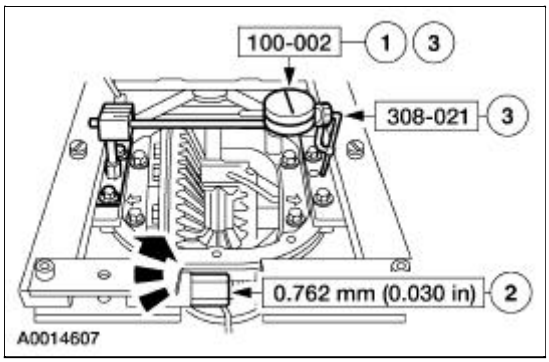


7. **CAUTION: Overspreading can damage the differential housing.**

   NOTE: Tighten and loosen the Differential Carrier Spreader screw to normalize the Housing Spreader Adapters prior to taking the final Dial Indicator reading.

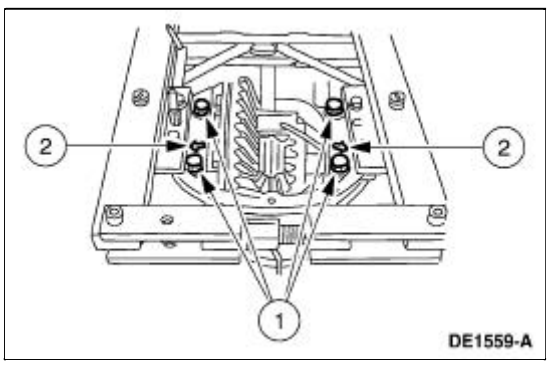
   Spread the differential housing to the specification.

1. Adjust the special tool to zero.
2. Tighten the screw until the differential housing is spread to the specification.
3. Remove the special tools.



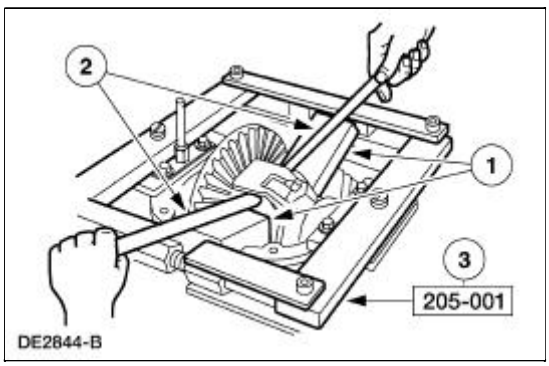
8. **CAUTION: Mark the position and location of the differential bearing caps as the arrows may not be visible. Always install the differential bearing caps in their identical location and position.**

Remove the differential bearing caps.
1. Remove the bolts.
2. Remove the differential bearing caps.



9. **CAUTION: Use wood blocks to avoid damaging the differential housing.**

Remove the differential assembly.
1. Position wood blocks at the top and bottom of the differential case (4204).
2. Pry the differential assembly and the differential bearing shims (4067) out of the differential housing.
3. Remove the special tool.

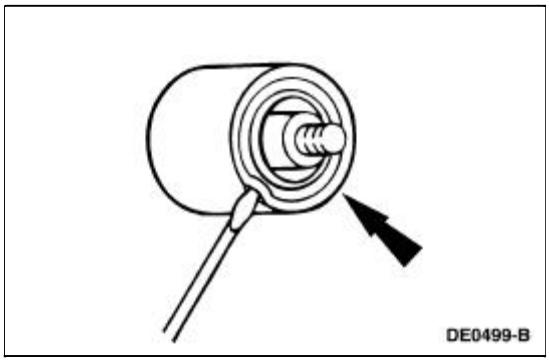


10. **CAUTION: Record the torque necessary to maintain rotation of the drive pinion gear**

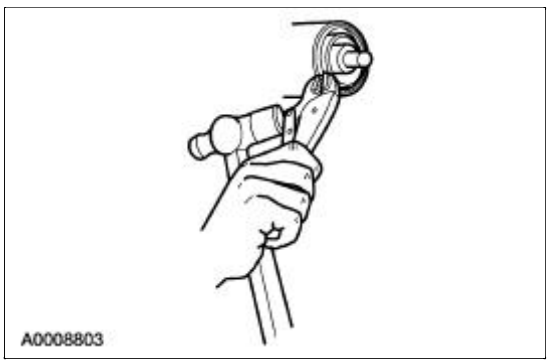
through several revolutions prior to removing the rear axle pinion flange (4851).

Remove the rear axle pinion flange. For additional information, refer to Drive Pinion Flange in this section.

11. Using a screwdriver, force the rear axle drive pinion seal metal flange up and strike it with a hammer.

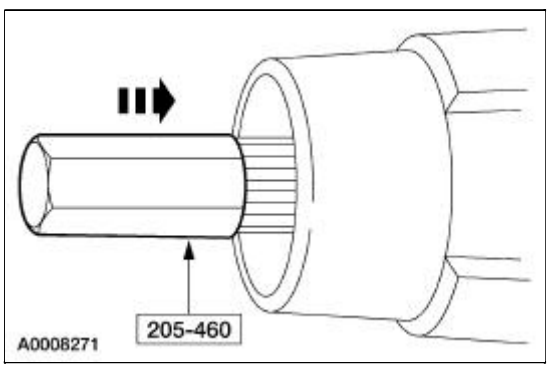


12. Using gripping pliers and a hammer, remove the rear axle drive pinion seal (4676).

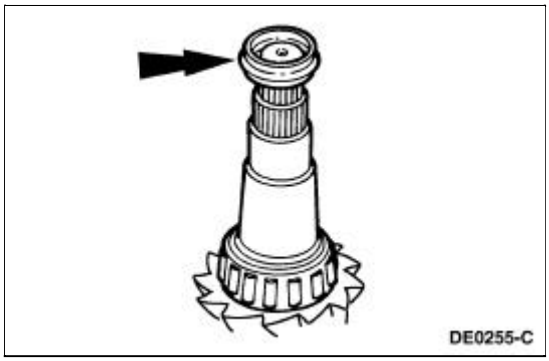


13. Remove the rear axle drive pinion shaft oil slinger (4670).

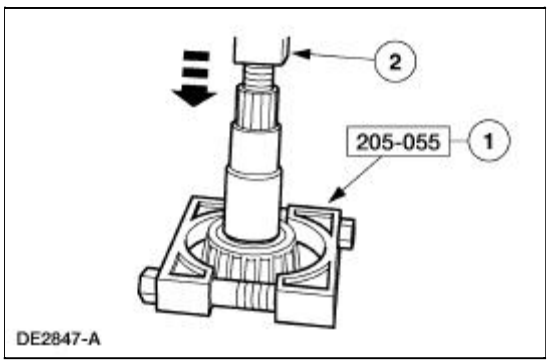
14. Using the special tool and a soft-faced hammer, drive the drive pinion gear out of the front pinion bearing (4621) and remove it through the rear of the differential housing.



15. Remove and discard the differential drive pinion collapsible spacer (4662).

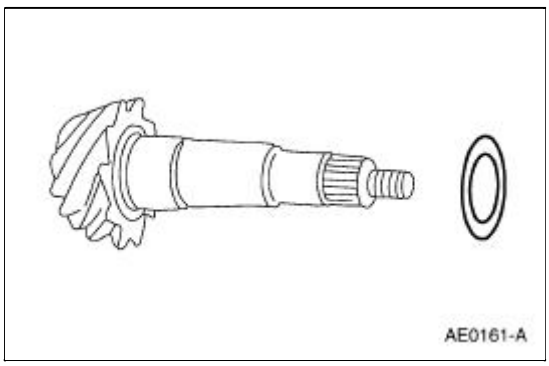


16. Using the special tool and a suitable press, remove the pinion bearing (4630).
    1. Position the special tool under the pinion bearing.
    2. Using a press, remove the pinion bearing.

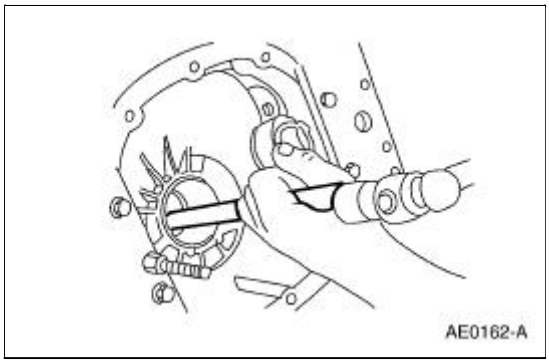


17. **NOTE:** Using a micrometer, measure the drive pinion bearing adjustment shim thickness. Use this measurement as a reference to compare to the shim gauge reading taken prior to installing the pinion bearing.

    Remove the drive pinion bearing adjustment shim (4663).



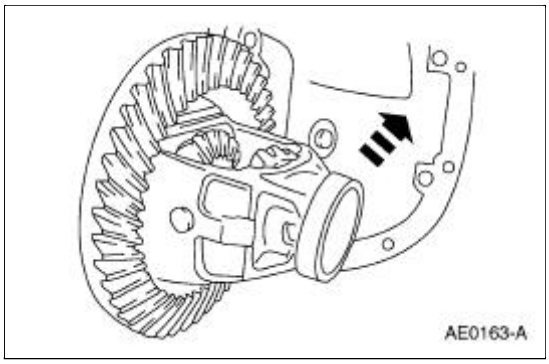
18. Using a brass drift and a hammer, remove any damaged differential drive pinion bearing cup (4616) (4628) from the differential housing. Tap alternately on each side of the cup to prevent it from cocking in the bore.



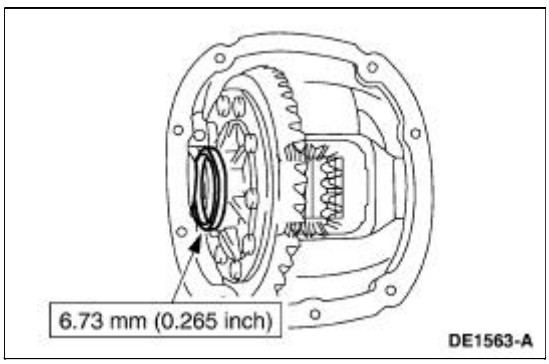
19. If the differential ring gear backface runout measurement, taken at the beginning of this procedure, did not exceed the specification, proceed to Final disassembly in this procedure. If the differential ring gear backface runout measurement, taken at the beginning of this procedure, exceeded the specification, the cause may be a warped differential ring gear, a damaged differential case, or loss of differential bearing preload. Proceed to Excessive differential ring gear backface runout in this procedure to verify the cause of the excessive runout.

Excessive differential ring gear backface runout

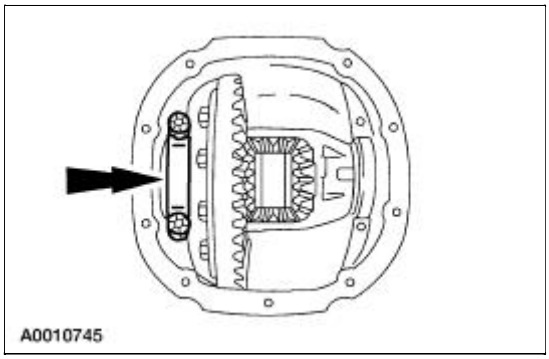
20. Place the differential assembly with the differential bearings (4221) and the differential bearing cups (4222) in the differential housing.



21. Install a differential bearing shim of the thickness shown on the LH side of the differential case.

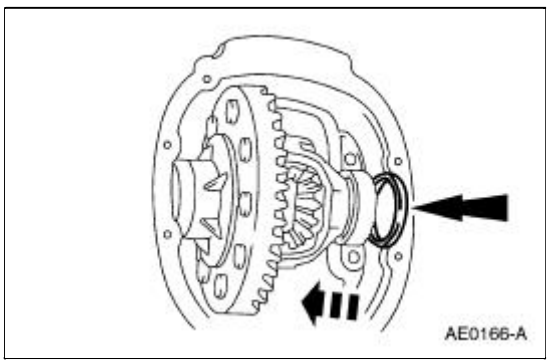


22. Install the LH differential bearing cap finger-tight.

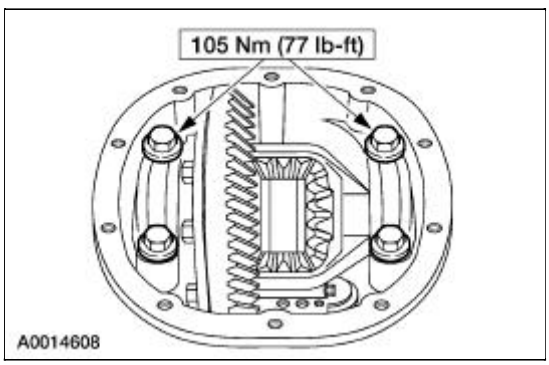


23. **NOTE:** Apply pressure toward the left side to fully seat the differential bearing cup.

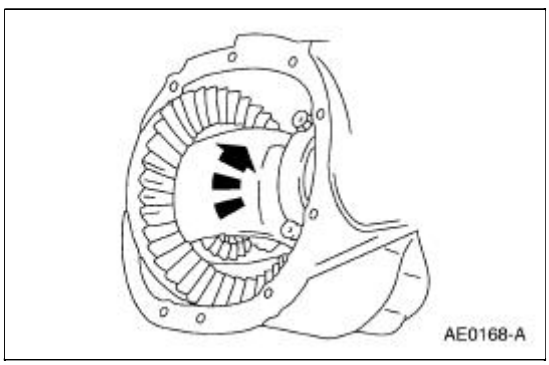
    Install progressively larger differential bearing shims on the RH side until the largest differential bearing shim selected can be assembled with a slight drag feel.



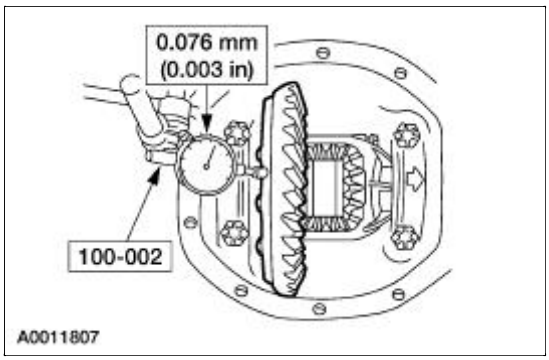
24. Install the RH differential bearing cap.
    - Tighten both bearing caps to specification.



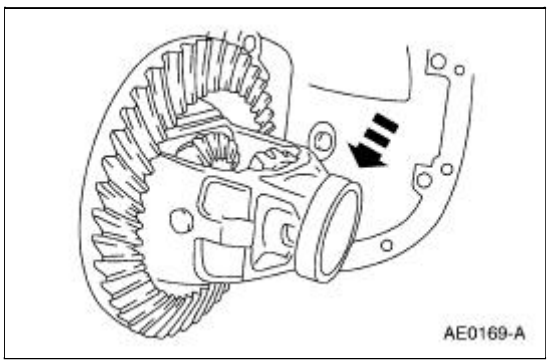
25. Rotate the differential assembly to make sure it turns freely.



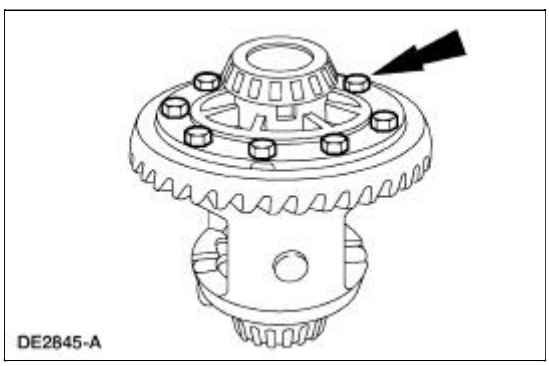
26. Using the special tool, measure and record the differential ring gear backface runout.
    - If the runout does not exceed the specification, the cause of the original excessive runout was due to a loss of differential bearing preload. Proceed to Final disassembly in this procedure.
    - If the runout exceeds the specification, proceed as follows.
        - Remove the special tool.



27. Remove the differential assembly.

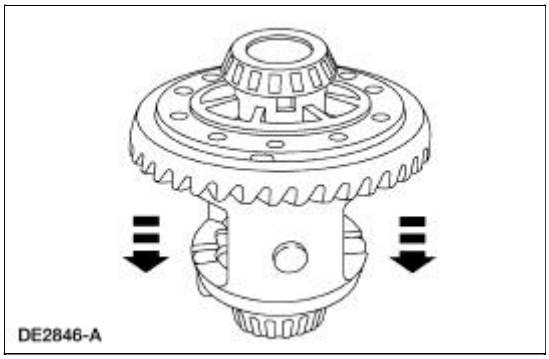


28. Remove the bolts.

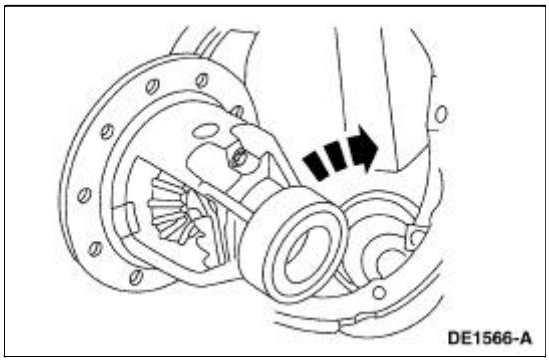


29. **CAUTION: Do not damage the bolt hole threads.**

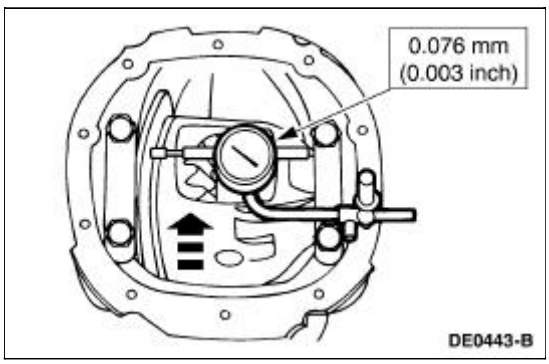
    Insert a punch in the bolt holes and drive off the differential ring gear.



30. Install the differential case. Rotate the differential case to seat the differential bearings.

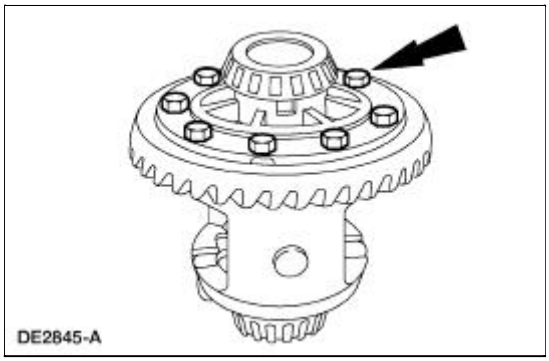


31. Using the special tool, measure the differential case flange runout.
    - If the runout does not exceed the specification, the cause of the original excessive runout is the differential ring gear. Remove the differential case. Discard the differential ring gear and the drive pinion gear. Proceed to Final disassembly in this procedure.
    - If the runout exceeds the specification, the differential ring gear is true and the concern is due to either differential case/differential bearing damage. Remove the differential case. Discard the differential bearings/differential case. Proceed to Final disassembly in this procedure.
        - Remove the special tool.



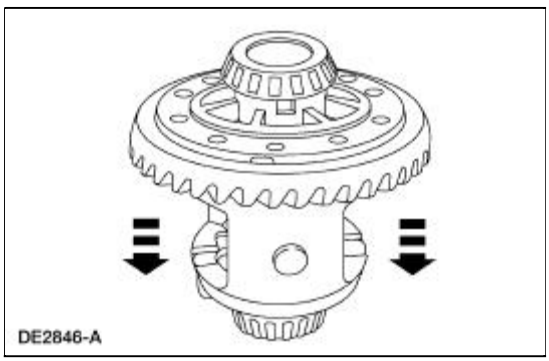
Final disassembly

32. If not done previously, remove the bolts.

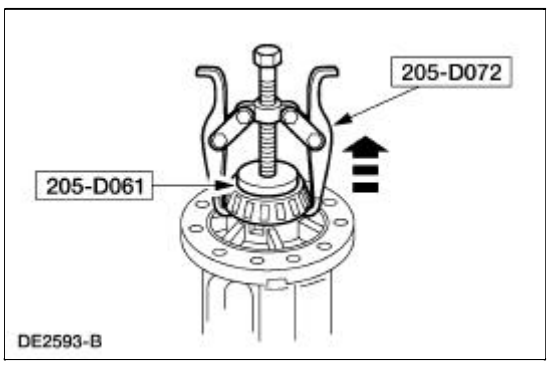


33. **CAUTION: Do not damage the bolt hole threads.**

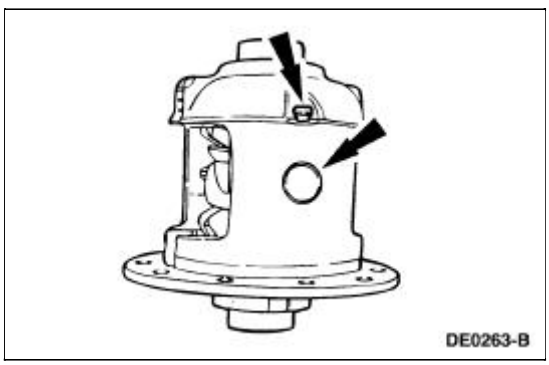
    If not done previously, insert a punch in the bolt holes and drive off the differential ring gear.



34. Using the special tools, remove the differential bearing.
    - Repeat for the other side.

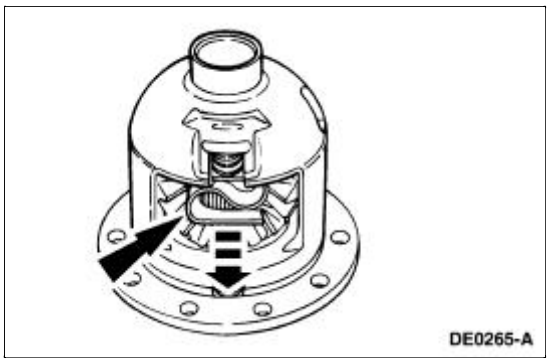


35. Remove the bolt and remove the differential pinion shaft (4211).

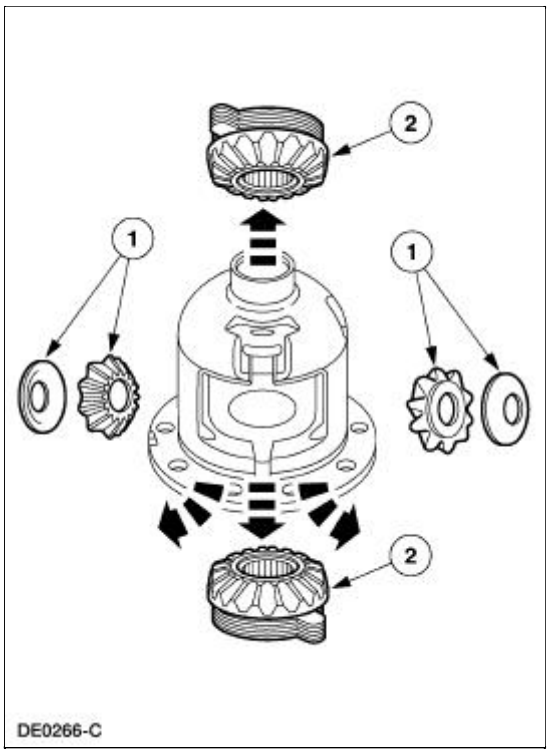


36. **WARNING: The differential clutch spring (4214) is under tension. Remove the spring carefully. Failure to follow these instructions may result in personal injury.**

Remove the differential clutch spring.



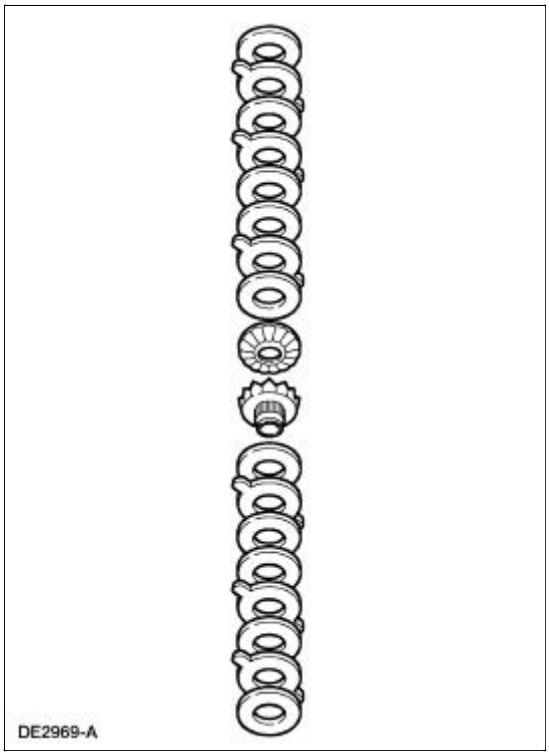
37. Remove the differential gears.
    1. Remove the two differential pinion gears (4215) and pinion thrust washers (4230).
    2. Remove the two differential side gears (4236) with the clutch packs (4947) and the shims and tag them "left" and "right."



38. **CAUTION: Keep the differential clutch packs in order. Do not mix them. Always reassemble them in the same sequence.**

Remove the differential clutch packs and shims from the differential side gears.

- Clean and inspect the remaining differential components for wear and damage. Install new parts as necessary.



39. **CAUTION: Do not use acids or solvents when cleaning the differential clutch packs. Wipe the components only with a clean, lint-free cloth.**

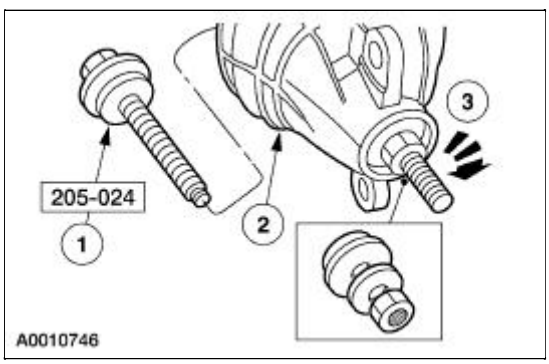
    Clean and inspect the differential clutch packs for wear and damage. Install new parts as necessary.

Assembly

Initial assembly

1. Coat the new differential drive pinion bearing cup(s) with lubricant.
   - Use SAE 75W-140 High Performance Rear Axle Lubricant F1TZ-19580-B or equivalent meeting Ford specification WSL-M2C192-A.

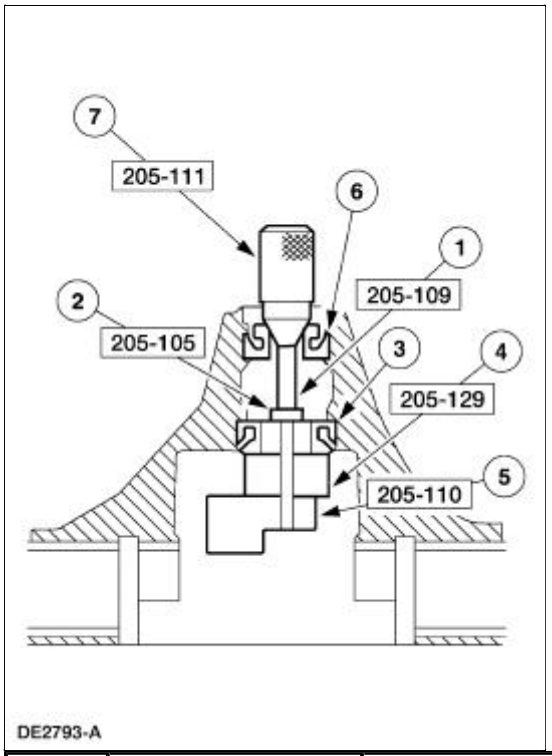
2. Using the special tool, install the differential drive pinion bearing cup(s).
   1. Position the bearing cup(s) on the special tool.
   2. Position the special tool and the bearing cup(s) in the differential housing.
   3. Tighten the special tool to fully seat the bearing cup(s) in the bore(s).



3. **NOTE:** Apply a light film of SAE 75W-140 High Performance Rear Axle Lubricant F1TZ-19580-B or equivalent meeting Ford specification WSL-M2C192-A on the front and rear pinion

bearings.

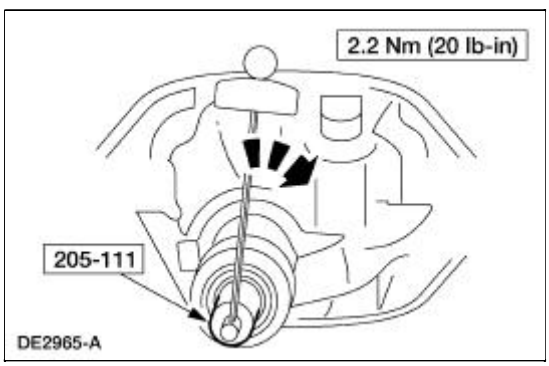
Install the pinion bearings and special tools as shown.



Item	Part Number	Description
1	205-109	Adapter for 205-S127
2	205-105	Adapter for 205-S127
3	4630	Rear (inner) pinion bearing
4	205-129	Adapter for 205-S127
5	205-110	Adapter for 205-S127
6	4621	Front (outer) pinion bearing
7	205-111	Adapter for 205-S127

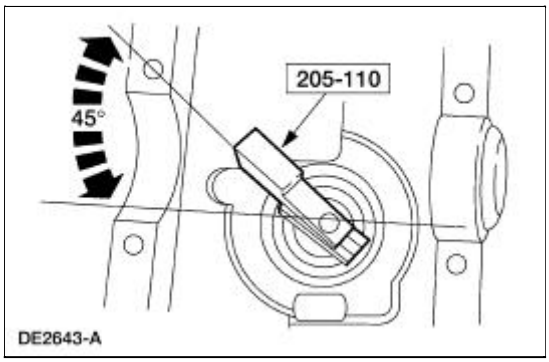
4. **NOTE:** This step duplicates pinion bearing preload.

   Thread the special tool onto the Screw and tighten to the specification shown.

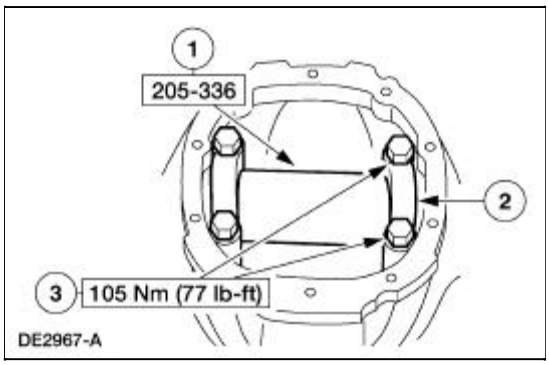


5. **CAUTION: Offset the special tool to obtain an accurate reading.**

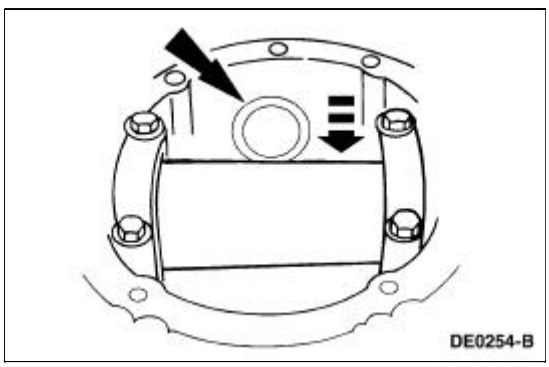
Rotate the special tool several half turns to seat the pinion bearings. Position the special tool as shown.



6. Install the special tool.
    1. Position the special tool on the differential housing differential bearing seat.
    2. Install the differential bearing caps.
    3. Install the bolts.



7. Use a drive pinion bearing adjustment shim as a gauge for shim selection. Check the drive pinion bearing adjustment shim thickness between the Gauge Block and the Gauge Tube. A slight drag indicates correct shim selection.

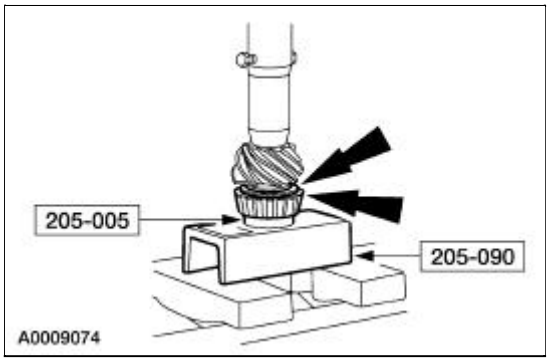


8. Remove all of the special tools.

9. **CAUTION: Use the same pinion bearings and drive pinion bearing adjustment shim from the drive pinion bearing adjustment shim selection procedure for final assembly.**

    Position the drive pinion bearing adjustment shim and the pinion bearing on the drive pinion gear stem.

10. Using the special tools and a suitable press, firmly seat the drive pinion bearing adjustment shim and pinion bearing on the drive pinion gear stem.



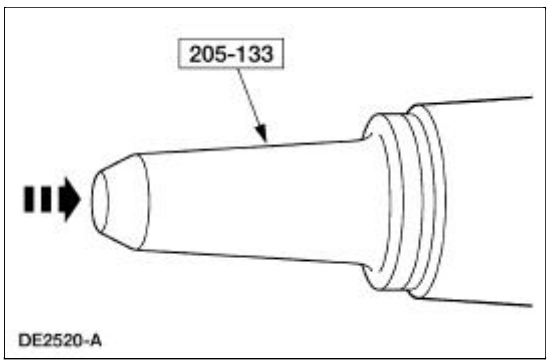
11. Install the front pinion bearing and the rear axle drive pinion shaft oil slinger in the differential housing.

12. **CAUTION: Installation without the correct tool can result in early seal failure.**

    CAUTION: If the seal becomes misaligned during installation, remove it and install a new one.

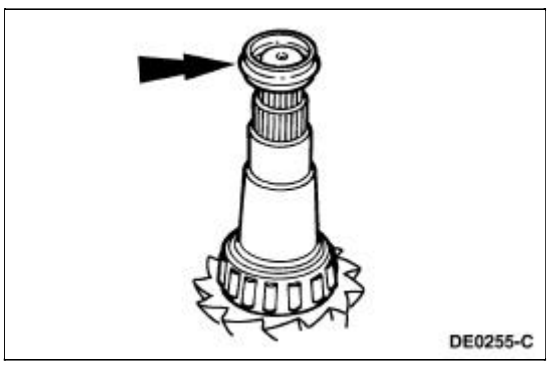
    NOTE: Coat the rear axle drive pinion seal lips with Premium Long-Life Grease XG-1-C or equivalent meeting Ford specification ESA-M1C75-B.

    Using the special tool, install the new rear axle drive pinion seal.



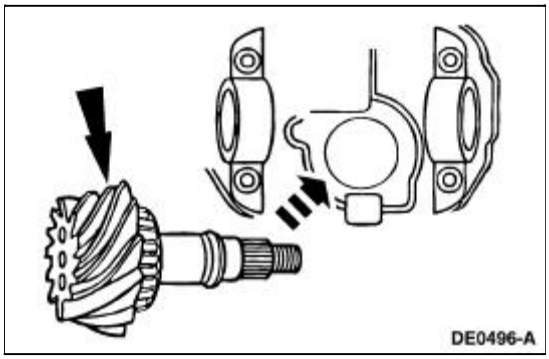
13. **CAUTION: Make sure the splines on the drive pinion gear stem are free of burrs. If burrs are evident, remove them using a fine crocus cloth, work in a rotational motion.**

    Place a new differential drive pinion collapsible spacer on the drive pinion gear stem against the pinion stem shoulder.



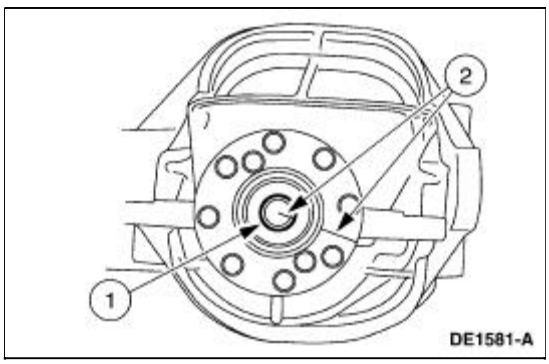
14. Install the drive pinion gear with the differential drive pinion collapsible spacer in the differential

housing.

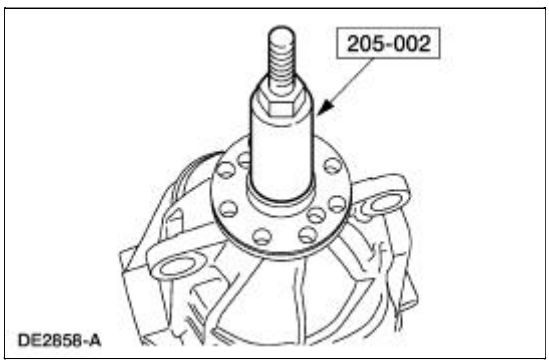


15. **NOTE:** Disregard the index marks if installing a new rear axle pinion flange.

    Position the rear axle pinion flange.
    1. Lubricate the rear axle pinion flange splines.
        - Use SAE 75W-140 High Performance Rear Axle Lubricant F1TZ-19580-B or equivalent meeting Ford specification WSL-M2C192-A.
    2. Position the rear axle pinion flange.



16. Using the special tool, install the rear axle pinion flange.

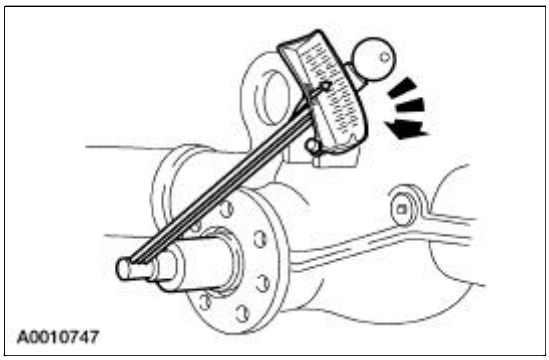


17. **CAUTION: Do not under any circumstance loosen the nut to reduce preload. If it is necessary to reduce preload, install a new differential drive pinion collapsible spacer and nut.**

    Tighten the nut to set the preload.
    - Rotate the pinion occasionally to make sure the pinion bearings seat correctly. Take frequent pinion bearing torque preload readings by rotating the drive pinion gear with a Nm (inch/pound) torque wrench.
    - For new pinion bearings, tighten the nut to specification. Refer to torque specifications for

new pinion bearings in the Specifications portion of this section.

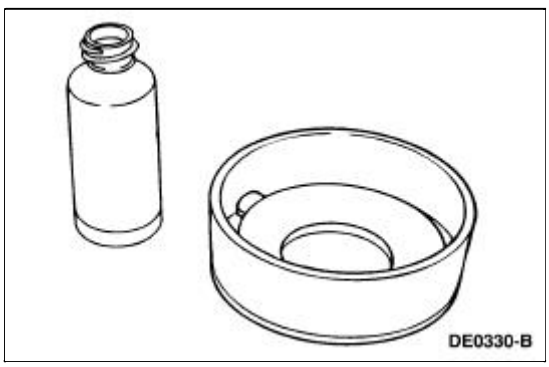
- For used pinion bearings, if the preload recorded prior to disassembly is lower than the specification for used bearings, then tighten the nut to specification. Refer to torque specifications for used pinion bearings in the Specifications portion of this section.
- For used pinion bearings, if the preload recorded prior to disassembly is higher than the specification for used bearings, then tighten the nut to the original reading as recorded.



18. **CAUTION: 118 ml (4 oz) of Additive Friction Modifier C8AZ-19B546-A or equivalent meeting Ford specification EST-M2C118-A must be used in the axle.**

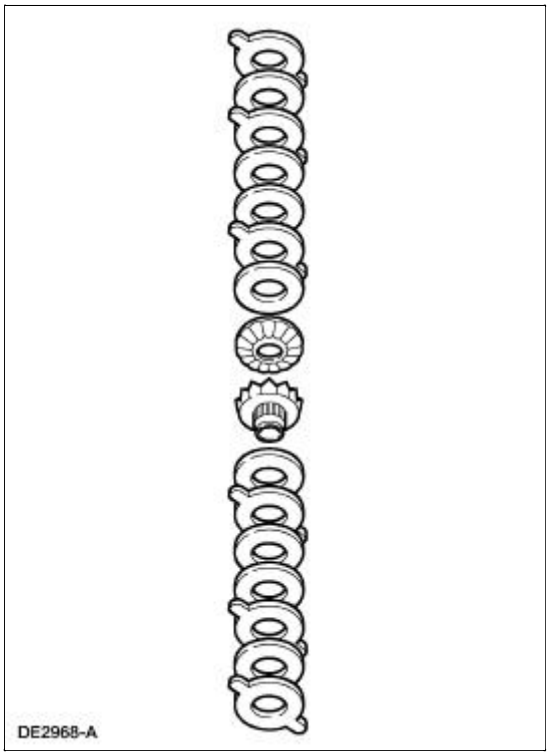
Lubricate each steel clutch plate and soak all friction plates for no less than 15 minutes.

- Use Additive Friction Modifier C8AZ-19B546-A or equivalent meeting Ford specification EST-M2C118-A.

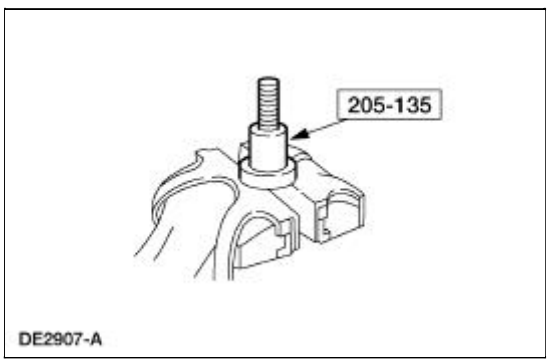


19. **CAUTION: Do not mix the clutch plates, clutch discs or shim from one side with the other.**

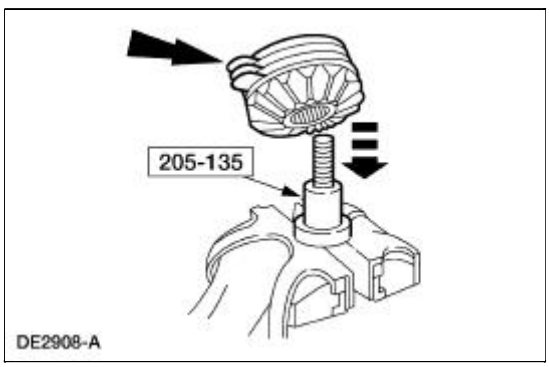
Assemble the differential clutch packs (without the shims) on their respective differential side gear.



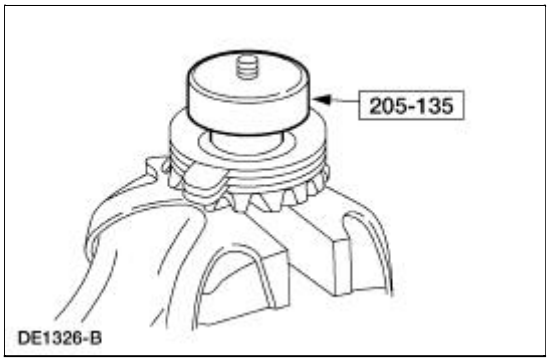
20. Place the base portion of the special tool in a vise.



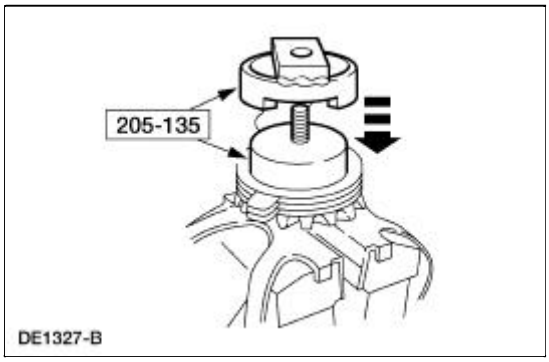
21. Install the differential clutch pack and differential side gear (without the shim) on the special tool.



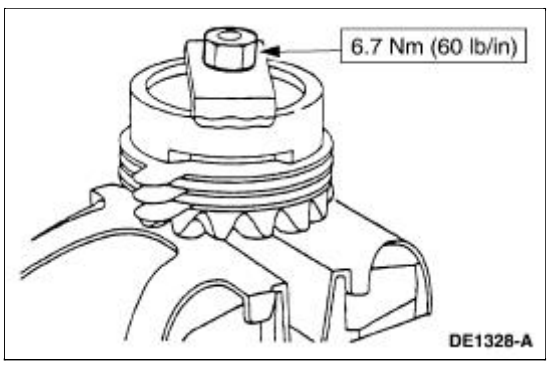
22. Position the special tool hand-tight on top of the differential clutch pack.



23. Install the special tool over the disc and differential clutch pack.



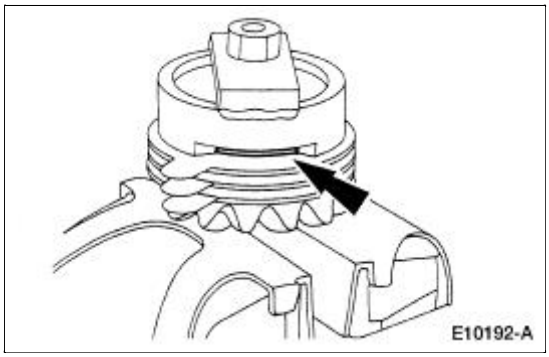
24. Install the nut.



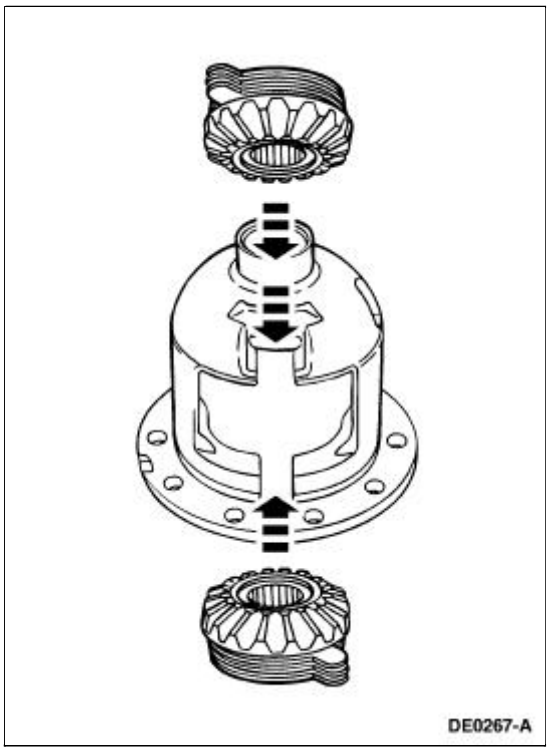
25. Select and insert the thickest feeler gauge blade that will enter between the tool and the differential clutch pack. The reading will be the thickness of the new clutch shim.

Selective Shims

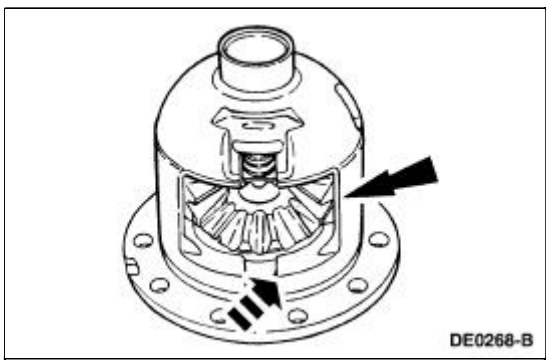
Part Number	Description
EOAZ-4A324-G	0.025 Inch
EOAZ-4A324-H	0.030 Inch
EOAZ-4A324-C	0.035 Inch
EOAZ-4A324-D	0.040 Inch
EOAZ-4A324-F	0.045 Inch



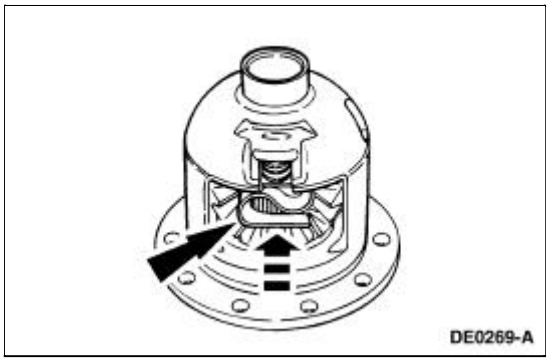
26. Remove the special tool from the differential clutch pack and differential side gear assembly.
27. Install the shim(s) on the differential clutch pack and differential side gear assembly.
28. Install the differential side gear assemblies in the differential case.



29. Install the differential pinion gear and differential pinion thrust washer assemblies in the differential case.

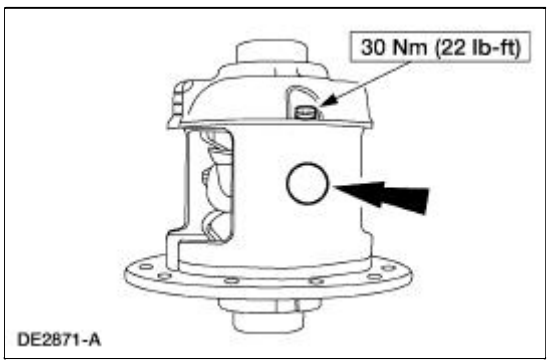


30. Using a soft-faced hammer, install the differential clutch spring.

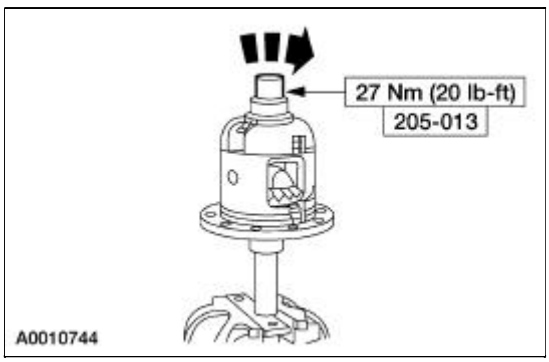


31. **NOTE:** If a new bolt is unavailable, coat the original bolt threads with Threadlock and Sealer EOAZ-19554-AA or equivalent meeting Ford specification WSK-M2G351-A5 prior to final installation.

    Install the differential pinion shaft and install a new bolt finger-tight.

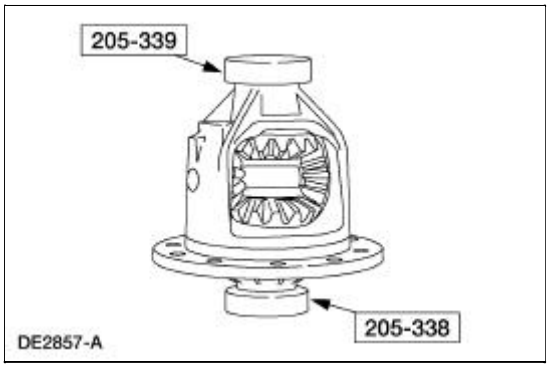


32. Mount the differential case and the special tool in a vise. Using the special tool, check the torque necessary to rotate one differential side gear.
    - If reusing the original clutch plates, the initial minimum break-away torque must be no less than the specification. The minimum rotating torque necessary to keep the differential side gear turning with new clutch plates may vary.



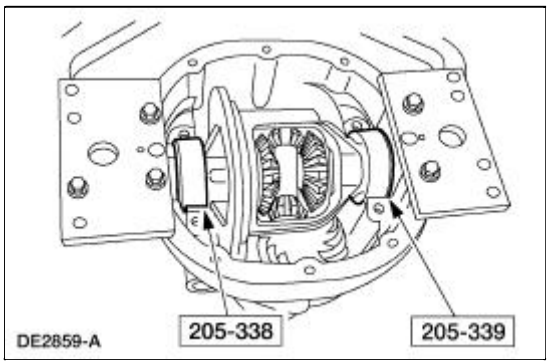
33. **CAUTION: The Master bearings are marked LH and RH. Install them as shown.**

    Install the special tools on the differential case.

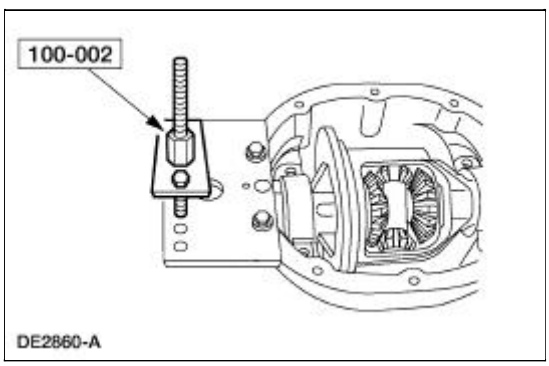


34. **CAUTION: Do not damage the aluminum differential housing while carrying out these procedures.**

    Place the differential case with the special tools in the differential housing.



35. Position the special tool on the outside mounting hole.



36. **NOTE:** Repeat this step until obtaining a consistent reading.

    Measure the total end play.
    1. Attach the special tool and position the indicator tip on the machined surface of the differential case flange.
    2. Move the differential case to the left and the right (as far as possible).
    3. Record the reading on the differential bearing shim selection procedure line A.

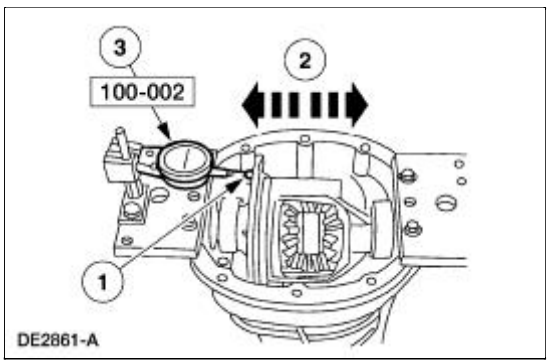
Differential Bearing Shim Selection Chart

8.8-inch Aluminum Axle	Example	Actual
Line-A End play without ring gear	0.498	
Line-B End play with ring gear (ring gear side)	-0.245	Minus (-)
Line-C Subtract Line-B from Line-A, also record on Line C, below	0.253	

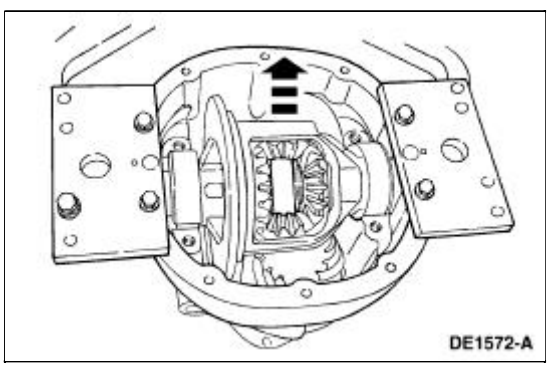
8.8-inch Aluminum Axle	Left Differential Bearing Height		Right Differential Bearing Height	
	Example	Actual	Example	Actual
Master bearing height	0.8695	0.8695	0.8695	0.8695
Line-D Actual bearing height	-0.8478	Minus (-)	-0.8491	Minus (-)
Line-E Difference	0.0217		0.0204	

8.8-inch Aluminum Axle	Left Side		8.8-inch Aluminum Axle	Right Side	
	Example	Actual		Example	Actual
Line-B End play Line-E Bearing height	0.2450 +0.0217	+	Line-C End play Line-E Bearing height	0.2530 +0.0204	+
TOTAL Lines B and E Backlash (subtract)	0.2667 -0.0060	-0.006	TOTAL Lines C and E Backlash/preload (add)	0.2734 +0.020	+0.020
Initial thickness [a]	0.2607		Initial thickness	0.2934	
Final shim thickness — left	0.261		Final shim thickness — right	0.293	

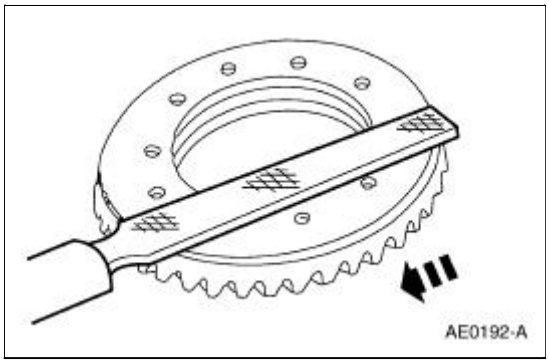
[a] Round off initial thickness to the nearest shim thickness as in example for final shim thickness.



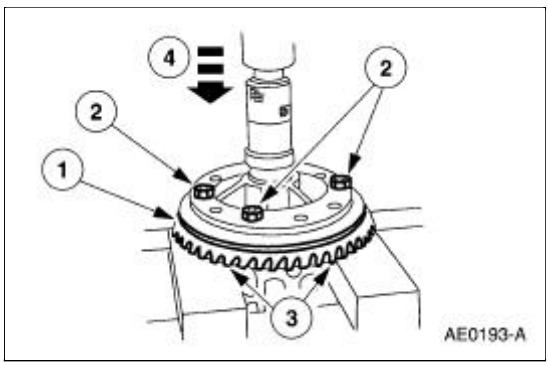
37. Remove the Dial Indicator and the differential case from the differential housing.



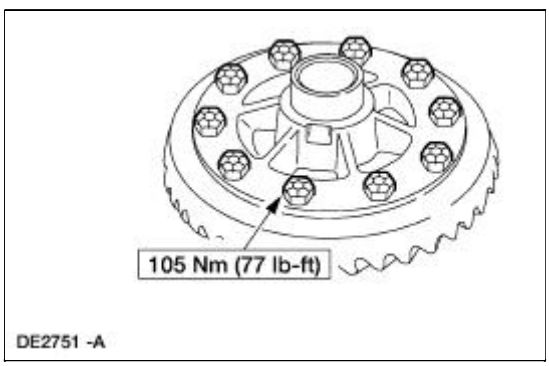
38. Draw-file the differential ring gear mounting surface to remove any nicks or burrs.



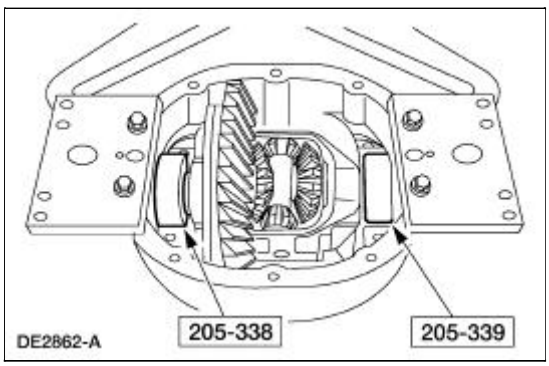
39. Install the differential ring gear.
    1. Place the differential ring gear on the differential case.
    2. Hand start three bolts to align the holes in the differential ring gear and the differential case.
    3. Place the differential case and differential ring gear onto the press bed blocks with the differential ring gear teeth facing downward.
    4. Press the differential ring gear into place.



40. Install the remaining bolts.

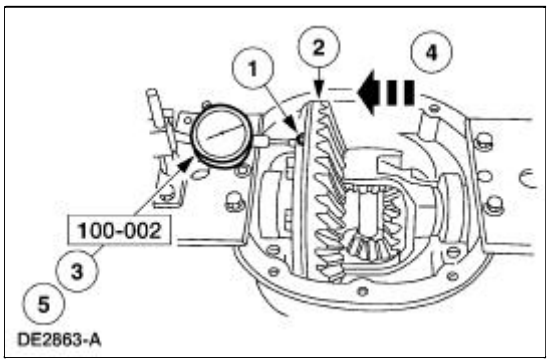


41. Place the differential case with the special tools into the differential housing.

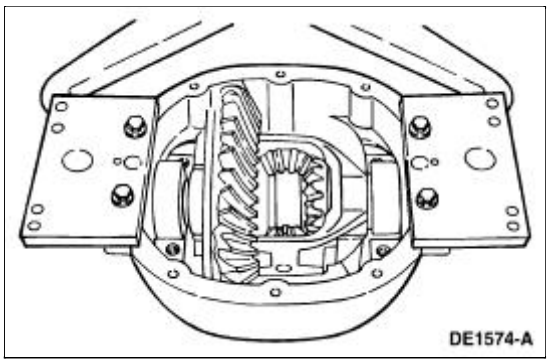


42. **NOTE:** The bolts retaining the differential ring gear to the differential case may interfere while carrying out this procedure. If so, remove three to five bolts to provide clearance.

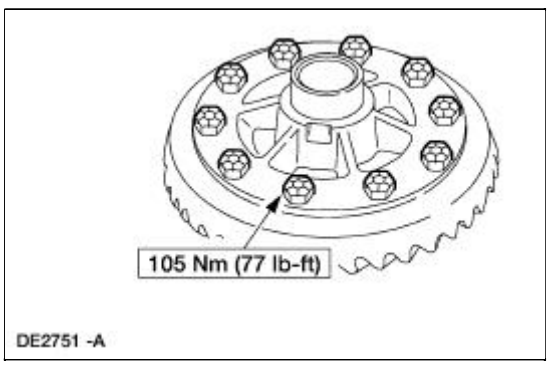
    Measure the end play.
    1. Attach the special tool and position the indicator tip on the machined surface of the differential case flange.
    2. Rock the differential ring gear to allow full mesh with the drive pinion gear.
    3. With the gears in full mesh, set the special tool to zero.
    4. Move the differential case as far as possible to the left and note the reading.
    5. Record the reading on the differential bearing shim selection procedure line B.
        - Remove the special tool.



43. Remove the differential case from the differential housing.



44. Remove the bolts. Apply Stud and Bearing Mount EOAZ-19554-BA or equivalent meeting Ford specification WSK-M2G349-A1 to the bolt threads, and reinstall the bolts.

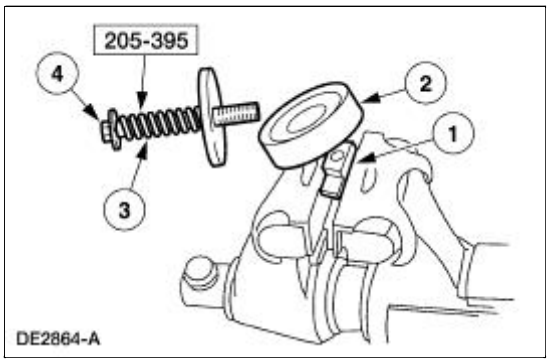


45. **NOTE:** Measure the stand height of both differential bearings prior to installation.

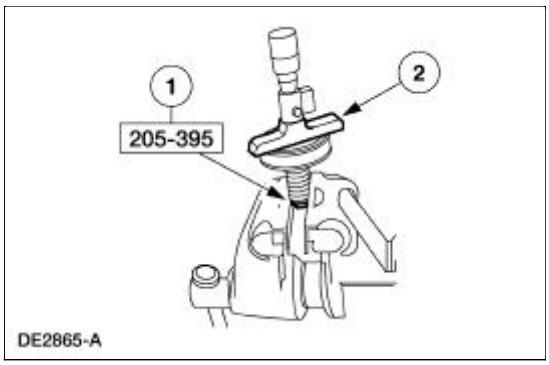
    NOTE: Mark the differential bearings left and right before measuring them.

    Install the special tool.

1. Place the special tool base in a soft-jawed vise with the bearing mounting surface above the vise jaws.
2. Position the differential bearing on the special tool base.
3. Attach the bolt, spring, washers and spacer.
4. Tighten the bolt.

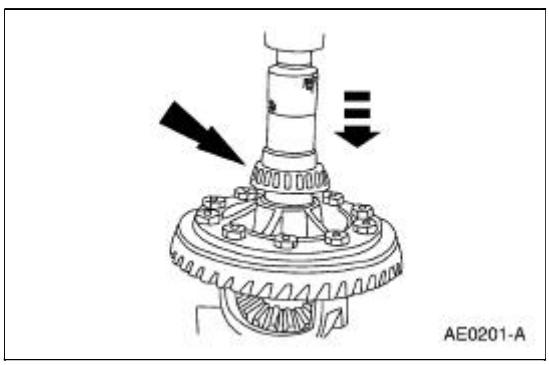


46. Measure the differential bearing stand height.
    1. Invert the special tool and clamp the bolt head in a vise.
    2. Position a depth micrometer flat on the differential bearing.

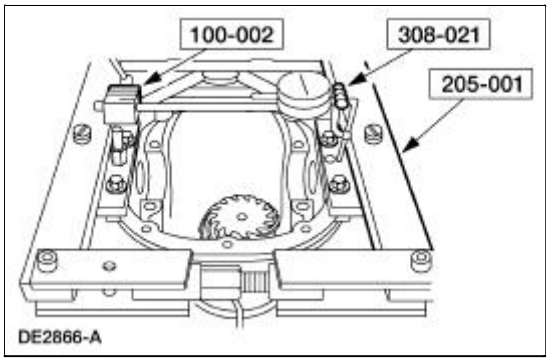


47. Measure both differential bearings stand height. Record the measurement on the differential bearing shim selection procedure line D.

48. Press the left and right differential bearing on the differential case.



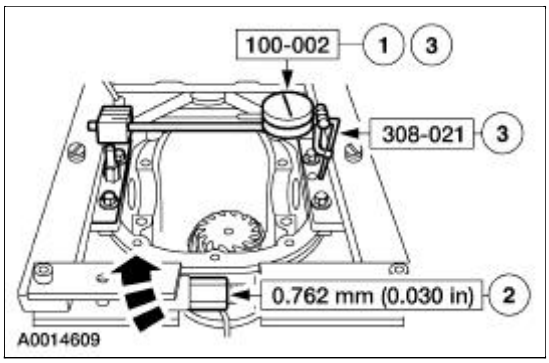
49. Install the special tools.



50. **CAUTION: Overspreading may damage the differential housing.**

NOTE: Tighten and loosen the Differential Carrier Spreader screw to normalize the Housing Spreader Adapters prior to taking the final Dial Indicator reading.

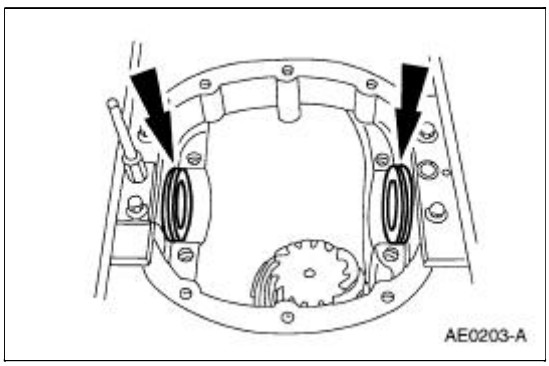
Spread the differential housing to the specification.
1. Adjust the special tool to zero.
2. Tighten the screw until spreading the differential housing to the specification.
3. Remove the special tools.



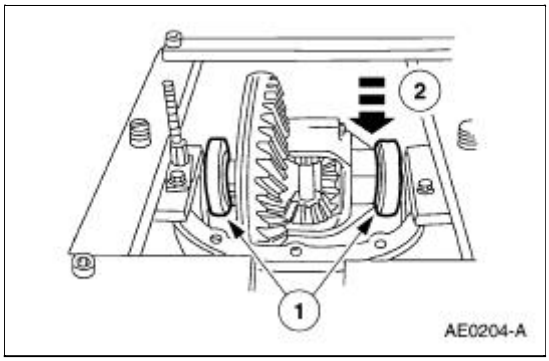
51. **NOTE:** Select the correct size differential bearing shims by completing the differential bearing shim selection chart.

NOTE: Apply a light coating of Premium Long-Life Grease XG-1-C, or equivalent meeting Ford specification ESA-M1C75-B to the differential bearing shim to help hold in place.

Place the differential bearing shims in the differential housing.

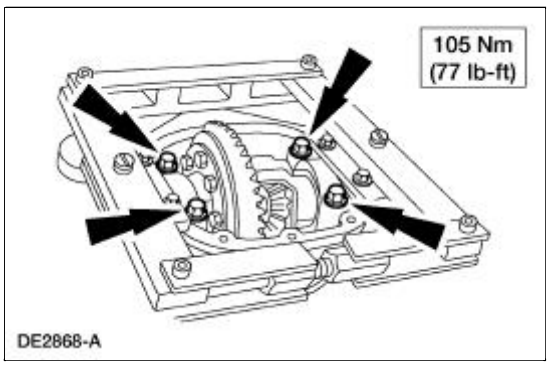


52. Install the differential case.
1. Position the differential bearing cups on the differential bearings.
2. Lower the differential case in place between the differential bearing shims.

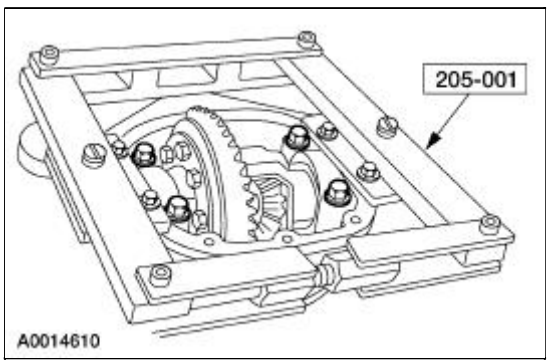


53. **NOTE:** Tighten the bolts prior to releasing the carrier spreader.

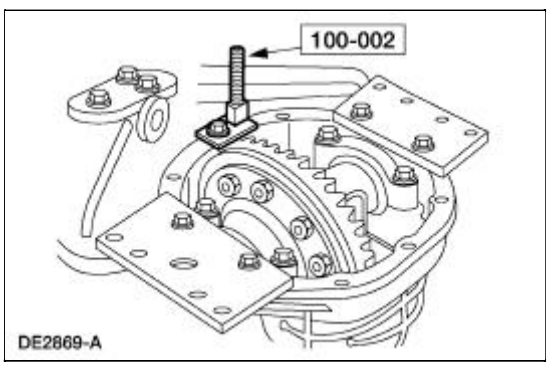
    Install the differential bearing caps in their original locations and positions and tighten the bolts.



54. Remove the special tool.

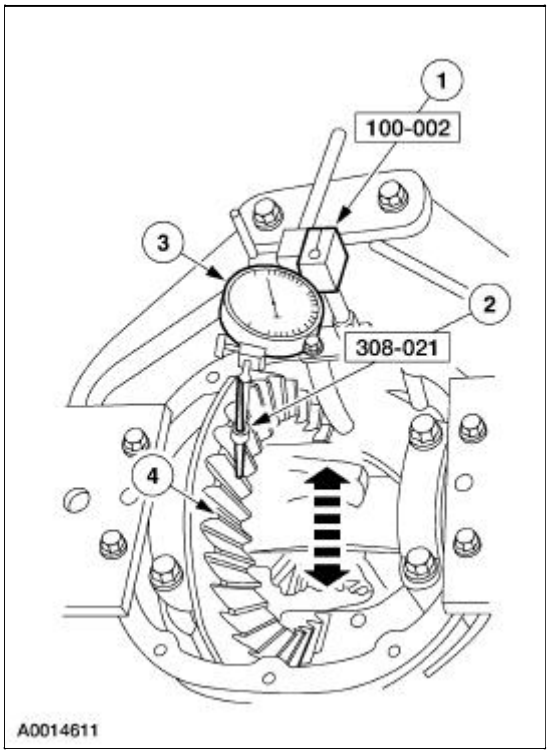


55. Install the special tool at the 12 o'clock position.



56. Using the special tools, measure the differential ring gear backlash at four equally spaced points.

1. Attach the special tool.
2. Position the special tool tip centrally on a drive tooth.
3. Zero the indicator.
4. Turn the differential ring gear without turning the drive pinion gear. Record the indicator reading. The allowable backlash is 0.203 mm (0.008 in) to 0.330 mm (0.013 in) and must not very more than 0.1016 mm (0.004 in) between points measured. A backlash variation of more than 0.1016 mm (0.004 in) between points checked indicates gear/case runout.
    - If backlash is within specifications, proceed to Final assembly in this procedure.
    - To correct for a high or low backlash proceed as follows.



57. To correct for high or low backlash increase the thickness of one differential bearing shim and decrease the thickness of the other differential bearing shim by the same amount. Refer to the following tables when adjusting the backlash. When the backlash is within specifications, proceed to Final assembly in this procedure.

Backlash Change Required		Thickness Change Required	
mm	**Inch**	**mm**	**Inch**
0.025	0.001	0.050	0.002
0.050	0.002	0.050	0.002
0.076	0.003	0.101	0.004
0.101	0.004	0.152	0.006
0.127	0.005	0.152	0.006
0.152	0.006	0.203	0.008
0.177	0.007	0.254	0.010
0.203	0.008	0.254	0.010
0.228	0.009	0.304	0.012
0.254	0.010	0.355	0.014
0.279	0.011	0.355	0.014

0.304	0.012	0.406	0.016
0.330	0.013	0.457	0.018
0.335	0.014	0.457	0.018
0.381	0.015	0.508	0.020

Differential Shim Size Chart — 4067 —

Numbers of Stripes and Color Code	Dimension A	
	mm	Inch
2—C-COAL	7.7978-7.8105	0.3070-0.3075
1—C-COAL	7.7470-7.7597	0.3050-0.3055
5—BLU	7.6962-7.7089	0.3030-0.3035
4—BLU	7.6454-7.6581	0.3010-0.3015
3—BLU	7.5946-7.6073	0.2990-0.2995
2—BLU	7.5458-7.5565	0.2970-0.2975
5—PINK	7.4422-7.4549	0.2930-0.2935
4—PINK	7.3914-7.4041	0.2910-0.2915
3—PINK	7.3406-7.3533	0.2890-0.2895
2—PINK	7.2898-7.3025	0.2870-0.2875
1—PINK	7.2390-7.2517	0.2850-0.2855
5—GRN	7.1882-7.2009	0.2830-0.2835
4—GRN	7.1374-7.1501	0.2810-0.2815
3—GRN	7.0866-7.0993	0.2790-0.2795
2—GRN	7.0358-7.0485	0.2770-0.2775
1—GRN	6.9850-7.0485	0.2750-0.2755
5—WH	6.9342-6.9469	0.2730-0.2735
4—WH	6.8834-6.8961	0.2710-0.2715
3—WH	6.8326-6.8453	0.2690-0.2695
2—WH	6.7818-6.7945	0.2670-0.2675
1—WH	6.7310-6.7437	0.2650-0.2655
5—YEL	6.6802-6.6929	0.2630-0.2635
4—YEL	6.6294-6.6421	0.2610-0.2615
3—YEL	6.5786-6.5913	0.2590-0.2595
2—YEL	6.5278-6.5405	0.2570-0.2575
1—YEL	6.4770-6.4897	0.2550-0.2555
5—ORNG	6.4262-6.4389	0.2530-0.2535
4—ORNG	6.3754-6.3881	0.2510-0.2515
3—ORNG	6.3246-6.3373	0.2490-0.2495
2—ORNG	6.2738-6.2865	0.2470-0.2475
1—ORNG	6.2223-6.2357	0.2450-0.2455
2—RED	6.1722-6.1849	0.2430-0.2435
1—RED	6.1214-6.1341	0.2410-0.2415

Final assembly

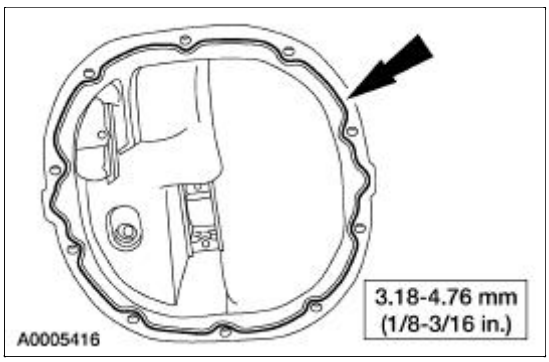
58. **CAUTION: The machined surfaces on the differential housing and the differential housing cover must be clean and free of oil before applying the new silicone sealant. Cover the inside of the axle before cleaning the machined surface to prevent contamination.**

    CAUTION: Install the differential housing cover within 15 minutes of applying the silicone material.

    CAUTION: Allow the sealant to cure for one hour before filling the axle with lubricant.

    Apply a continuous bead of sealant, of the specified thickness, to the differential housing cover mounting surface.

    - Use Clear Silicone Rubber F7AZ-19554-CA or equivalent meeting Ford specification ESB-M4G92-A.



59. Install the differential housing cover.

60. **CAUTION: First fill the rear axle (4001) with 118 ml (4 oz) of Additive Friction Modifier C8AZ-19B546-A or equivalent meeting Ford specification EST-M2C118-A.**

    Install the rear axle assembly in the vehicle. Fill the axle with the specified lubricant. For additional information, refer to Axle Housing in this section.

General Specifications

Item	Specification
Halfshaft assembled length	817.6 mm (32.19 in)

Torque Specifications

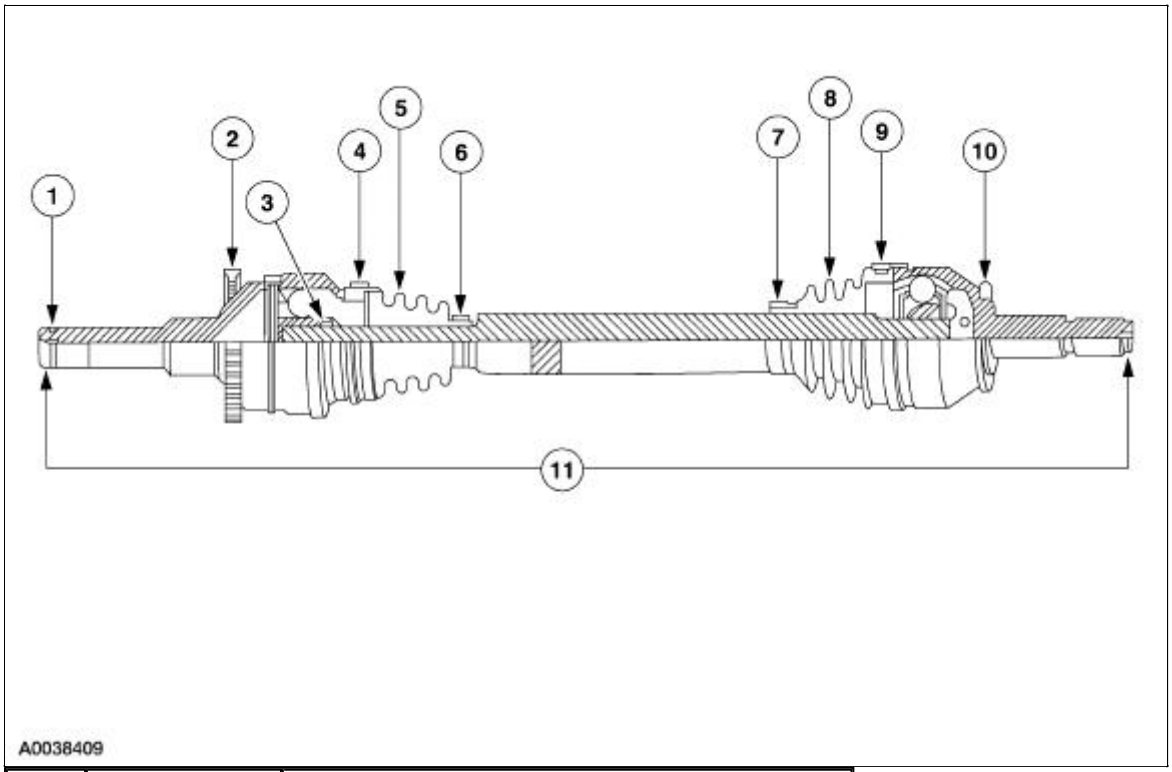
Description	Nm	lb-ft
Tie-rod end to knuckle	47	35
Shock absorber to suspension lower arm	133	98
Suspension upper arm and bushing to knuckle	90	66
Rear brake anti-lock sensor bolt	7	5
Rear axle wheel hub retainer	325	240

Rear Drive Halfshafts

The rear wheel drive halfshaft system consists of and operates as follows:

- Halfshafts (4K138) transmit engine torque from the rear axle housing to the rear wheels.
- Halfshafts rotate at approximately one-third the speed of a driveshaft and do not contribute to rotational vibration disturbances.
- A constant velocity (CV) joint is a mechanism for transmitting uniform torque and rotary motion while operating through a range of angles.
- CV joints at both inboard (differential) and outboard (wheel) ends provide operating smoothness.
- The inboard CV joints are plunge-type joints that provide the axial movement necessary to affect shaft length changes.
- The outboard CV joints have a higher angle capability than the inboard CV joints to accommodate suspension travel.
- Inboard and outboard CV joints connect to a splined shaft.
- A driveshaft bearing retainer circlip retains the splined inboard CV joint to the differential side gear. Install a new circlip every time you remove the halfshaft from the vehicle.
- A rear axle wheel hub retainer secures the interconnecting shaft and outboard CV joint to the rear hub.
- The lubed-for-life CV joints use special CV joint grease. They require no periodic lubrication.

- To separate the halfshaft from the rear hub, press the outboard CV joint from the rear hub.
- To separate the halfshaft from the differential, apply a load to the back face of the inboard CV joint assembly to overcome the circlip.
- The halfshaft assemblies are not repairable. Install a new assembly if worn/damaged.



Item	Part Number	Description
1	4B422	Driveshaft bearing retainer circlip
2	2C189	Rear brake anti-lock sensor indicator
3	—	Retaining ring (part of 4B402)
4	4B478	Boot clamp (large inboard)
5	—	Rear axle shaft inner boot (part of 4B402)
6	4B478	Boot clamp (small inboard)
7	4B478	Boot clamp (small outboard)
8	—	Rear axle shaft outer boot (part of 4B402)
9	4B478	Boot clamp (large outboard)
10	2217	Dust seal assembly
11	4B402	Halfshaft assembly

Halfshaft Handling

CAUTION: Never pick up or hold the halfshaft by the outboard joint.

Handle all halfshaft components carefully during removal and installation.

- Do not over-angle the CV joints.
- Damage will occur to an assembled inboard CV joint if it is over-plunged outward from the joint housing.
- Never use a hammer to remove or install the halfshafts.
- Never use the halfshaft assembly as a lever to position other components. Always support the free end of the halfshaft.
- Do not allow the boots to contact sharp edges or hot exhaust components.

- Do not drop assembled halfshafts. The impact will cut the boots from the inside without evidence of external damage.
- Inspect all machined surfaces and splines for damage.

Wheel and Tire Balancing, Rear

WARNING: Do not balance the rear wheels and tires while mounted on the vehicle. Possible tire disintegration, differential or halfshaft failure can result, causing personal injury or extensive component damage. Use an off-vehicle wheel and tire balancer only.

Hoisting

CAUTION: Use a frame-contact hoist only. Vehicle or component damage can result if other types of hoists are used.

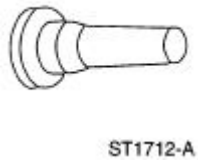
Never raise the vehicle using the halfshafts as lift points.

Undercoating and Rustproofing

During undercoating and rustproofing procedures, protect the boots from the coating materials. Foreign materials on the rubber boots will cause extreme advanced wear.

Halfshaft

Special Tool(s)

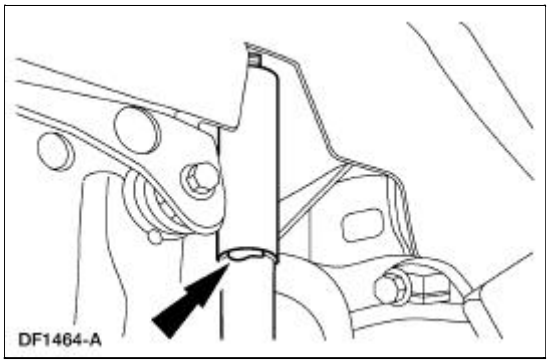
 ST1712-A	Differential Plug 205-294 (T89P-4850-B)
ST2258-A	Differential Seal Protector 205-461
ST2272-A	Front Hub Remover 205-D070 (D93P-1175-B) or Equivalent
ST2309-A	Halfshaft Removal Tool 205-475
ST2273-A	Steering Arm Remover 211-003 (T64P-3590-F)

Removal

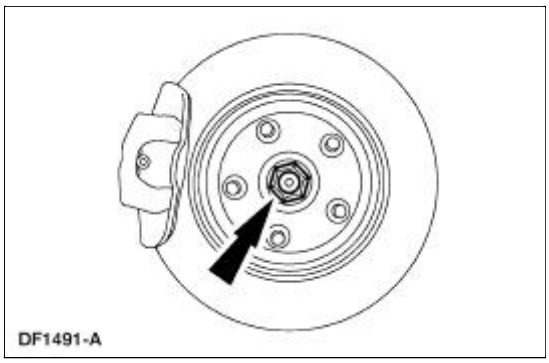
NOTE: This procedure applies to both the LH and RH halfshafts.

1. **CAUTION: The vehicle must be on level ground and at curb height.**

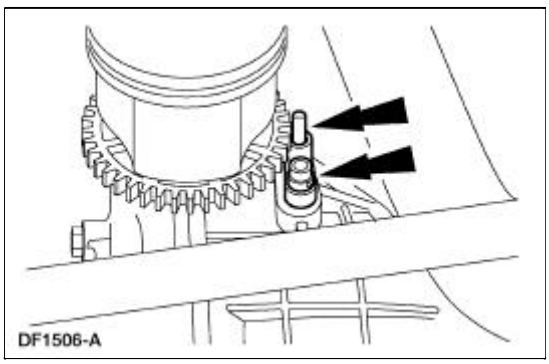
   Mark the rear shock absorber relative to the protective sleeve.
   - During installation, raise the suspension to this reference mark before tightening the suspension component fasteners.



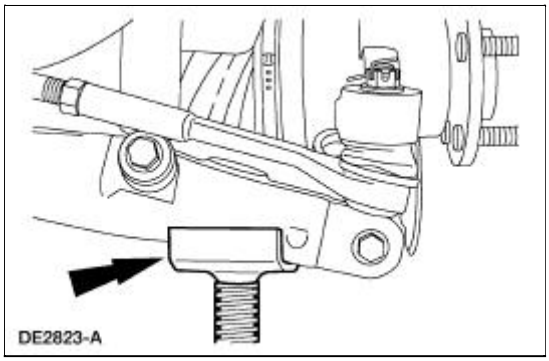
2. Raise and support the vehicle. For additional information, refer to Section 100-02 .
3. Remove the rear wheel and tire assembly. For additional information, refer to Section 204-04 .
4. Remove and discard the rear axle wheel hub retainer.



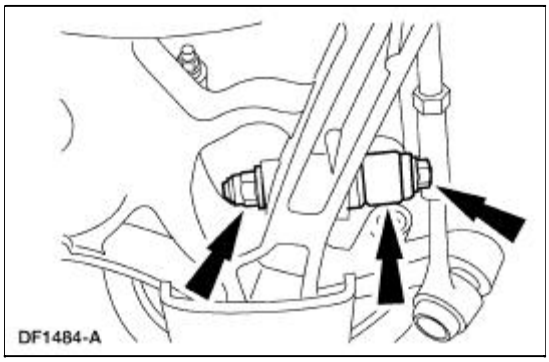
5. Remove the rear brake disc. For additional information, refer to Section 206-04 .
6. Remove the rear brake anti-lock sensor and position aside.



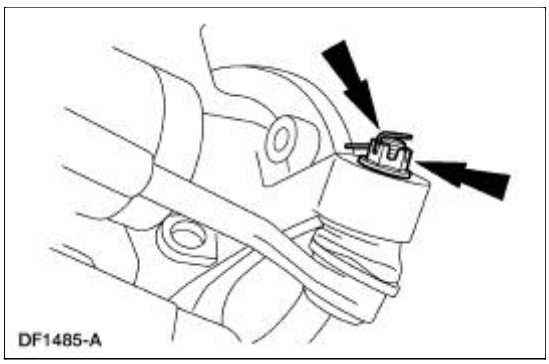
7. Support the suspension lower arm and bushing. This will ease removal of the lower shock absorber mount bolt.



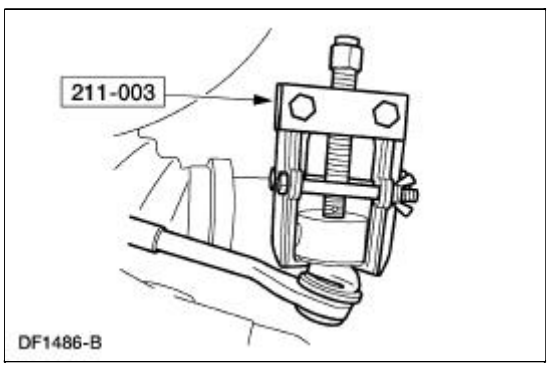
8. Disconnect the shock absorber at the suspension lower arm and bushing. Discard the nut and the bolt.



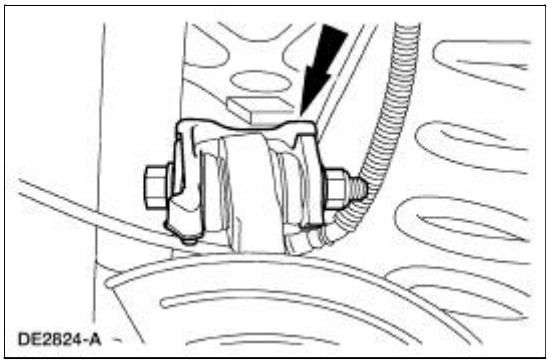
9. Remove and discard the cotter pin and the nut.



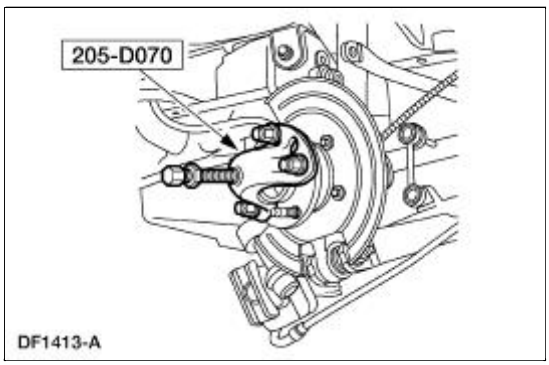
10. Using the special tool, disconnect the tie-rod link at the knuckle.



11. Disconnect the suspension upper arm and bushing at the knuckle. Discard the nut and the bolt.



12. Using the special tool, press the outboard CV joint until it is loose in the hub.

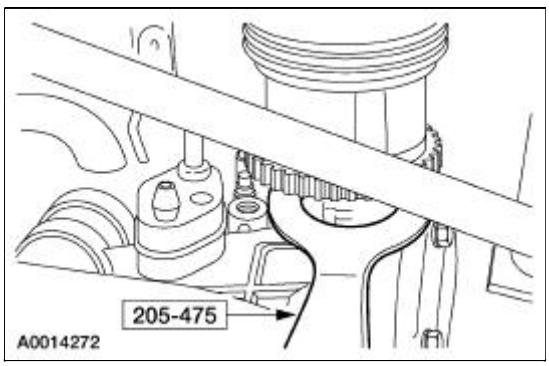


13. **CAUTION: Do not over-angulate the outboard CV joint or damage the boot.**

    While lowering the knuckle, remove the CV joint from the hub.

14. **CAUTION: The crown on the tool forks must face away from the axle housing. Position the special tool correctly between the CV joint and the axle housing so as not to damage the differential seal.**

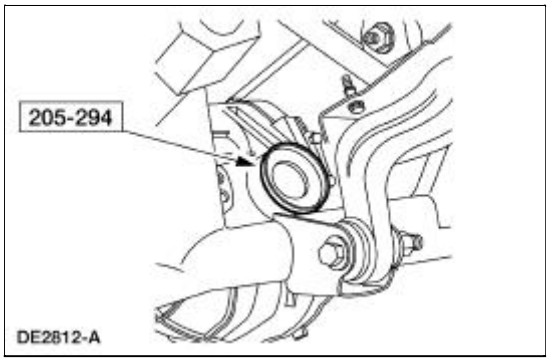
    Using the special tool, exert enough pressure to overcome the circlip and separate the CV joint (4K326) from the differential side gear.



15. **CAUTION: Do not damage the differential seal.**

    Carefully remove the halfshaft (4K138) with both hands.

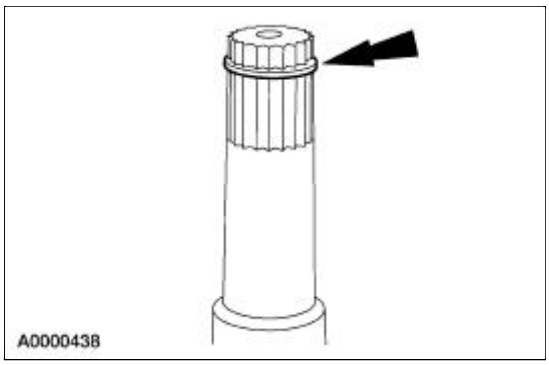
16. Install the special tool.



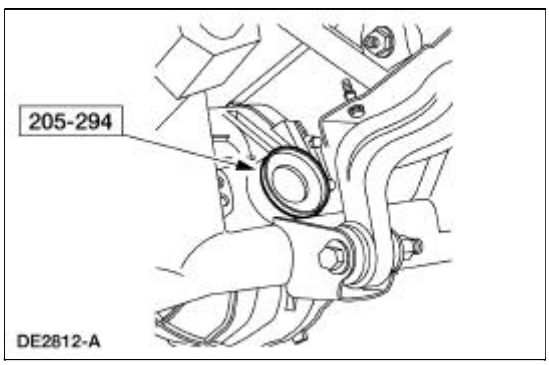
Installation

1. **NOTE:** This procedure applies to both the LH and RH halfshafts.

   Install a new driveshaft bearing retainer circlip.

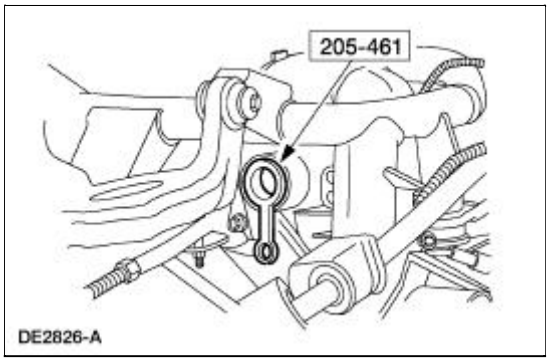


2. Remove the special tool.

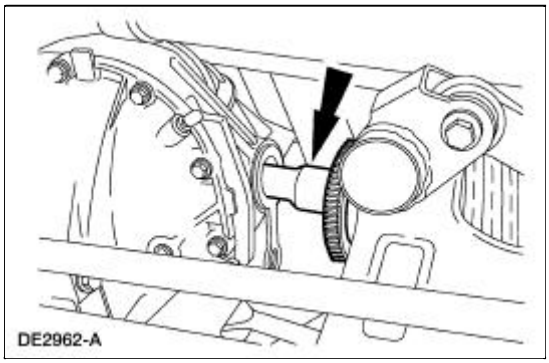


3. **CAUTION: Differential seal damage will occur if installing the halfshaft without the special tool installed.**

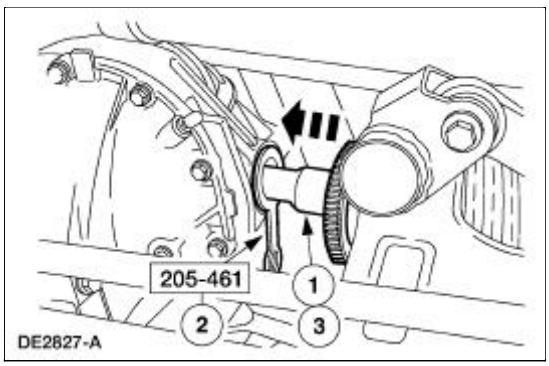
   Install the special tool.



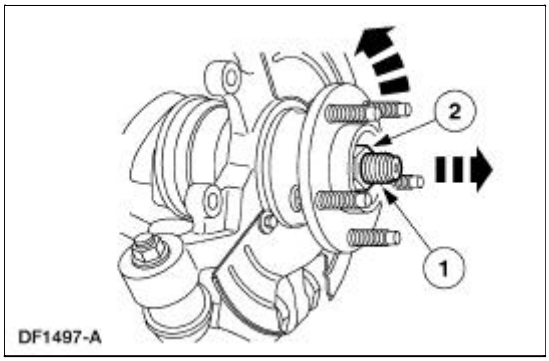
4. Position the halfshaft for installation.



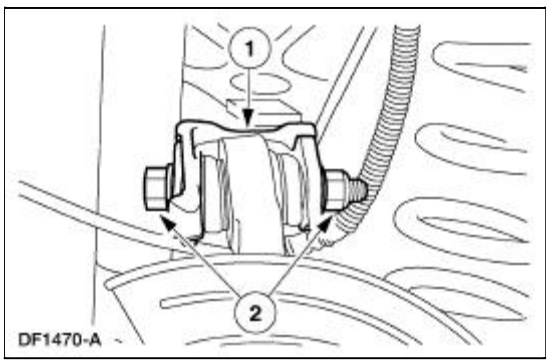
5. Seat the CV joint stub shaft in the differential side gear.
    1. Slide the stub shaft into the axle housing until the shaft splines are past the differential seal.
    2. Remove the special tool.
    3. Align the stub shaft splines and the side gear splines, and slide the stub shaft into the gear until it seats.
        - When seated, the axle circlip will lock the stub shaft in the differential side gear. Check the circlip engagement by attempting to pull the inboard CV joint out of the differential side gear. If the circlip has not seated, push the CV joint inward until the circlip is fully engaged in the differential side gear.



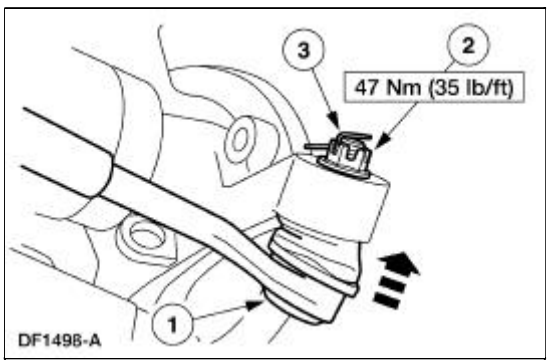
6. Connect the axle shaft to the hub.
    1. Making sure the serrations on the shaft line up with the serrations in the hub, install the axle shaft into the hub.
    2. Install a new retainer. Do not tighten the retainer at this time.



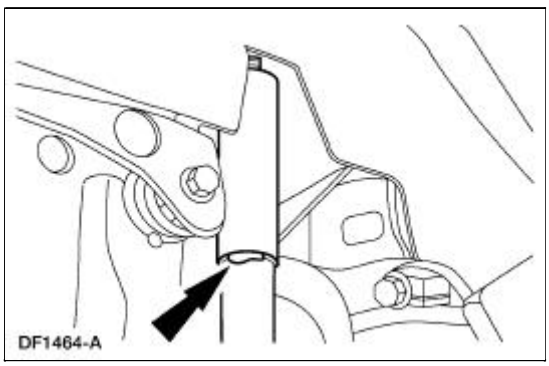
7. Connect the suspension upper arm and bushing to the knuckle.
    1. Position the suspension upper arm and bushing on the knuckle.
    2. Install the new bolt and a new nut. Do not tighten the nut at this time.



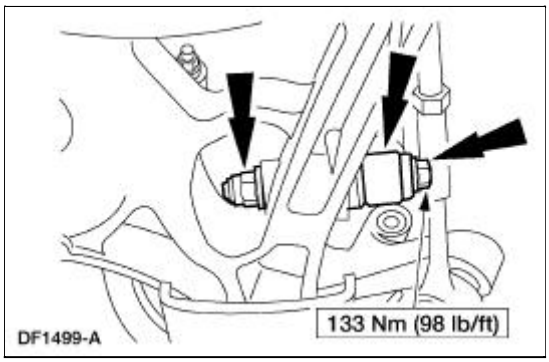
8. Connect the tie-rod end to the knuckle.
    1. Position the tie-rod link in the knuckle.
    2. Install a new nut.
    3. Install a new cotter pin.



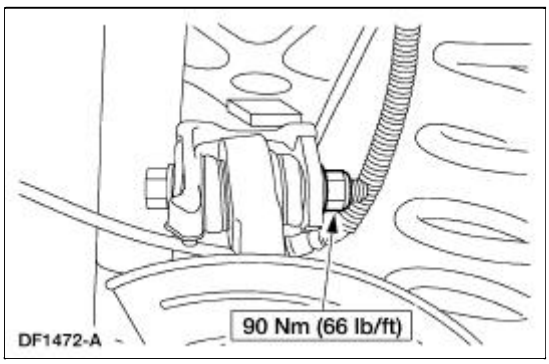
9. Raise the suspension until the shock absorber is compressed to the previously established alignment mark (curb height).



10. Connect the shock absorber to the suspension lower arm and bushing and install the new bolt and a new nut.

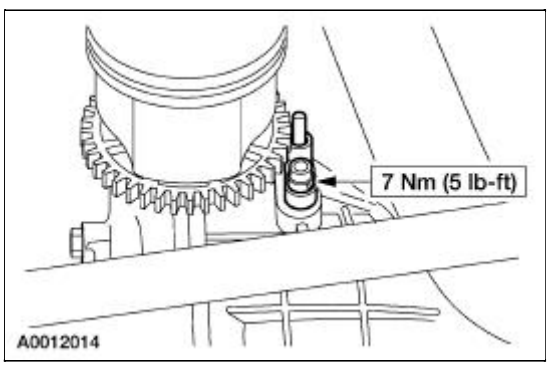


11. Tighten the nut.



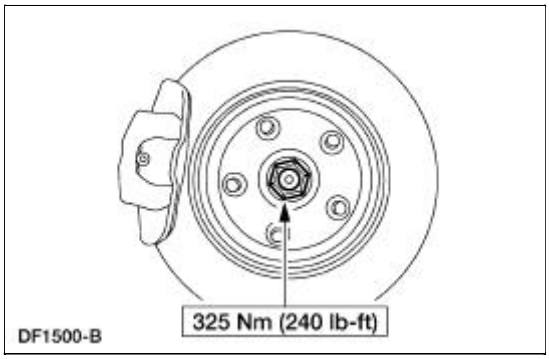
12. Lower the suspension and remove the jack stand.

13. Apply Anti-Seize Lubricant to the rear brake anti-lock sensor where it contacts the axle housing and install the anti-lock sensor.
    - Use High Temperature Nickel Anti-Seize Lubricant F6AZ-9L494-AA or equivalent meeting Ford specification ESE-M124A-A.



14. Install the rear brake disc. For additional information, refer to Section 206-04 .

15. Tighten the retainer.



16. Install the wheel and tire assembly. For additional information, refer to Section 204-04 .
17. Lower the vehicle.
18. Check the wheel alignment. Adjust as necessary. For additional information, refer to Section 204-00 .

Halfshaft Joint

Special Tool(s)

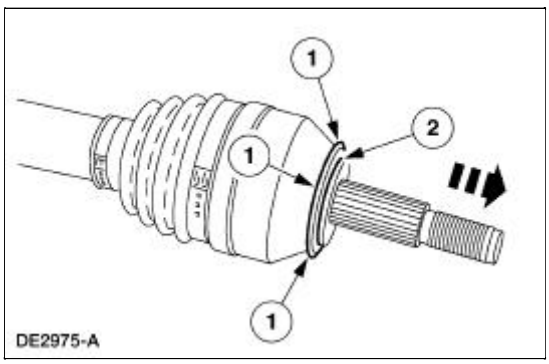
ST1710-A	Driver 205-199 (T83T-3132-A1)
ST1359-A	Hub Bearing Cup Replacer 205-147 (T80T-4000-P)
ST1713-A	Sensing Ring Replacer 206-041 (T89P-20202-A)

Disassembly

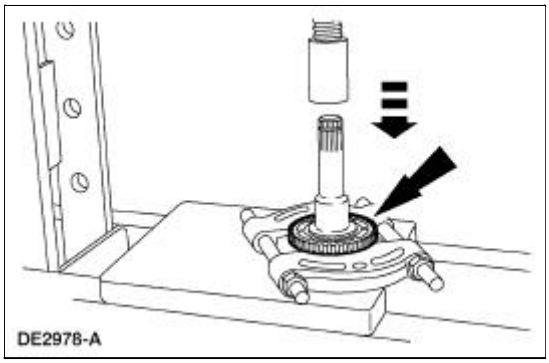
1. **CAUTION: Do not disassemble the halfshaft assembly. Install a new assembly if worn or damaged.**

   Remove the halfshaft from the vehicle. For additional information, refer to Halfshaft in this section.

2. If necessary, remove the dust seal assembly (2217).
   1. Tap uniformly around the dust seal assembly.
   2. Slide the dust seal assembly from the shaft.

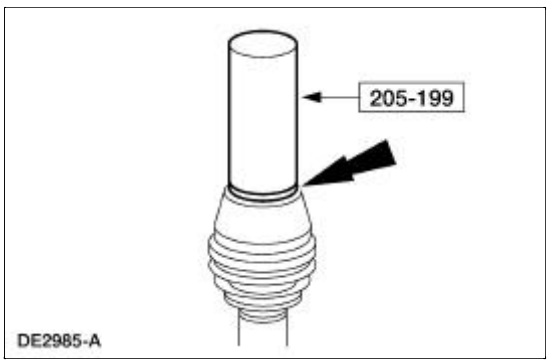


3. Using a suitable bearing plate and a press, remove the rear brake anti-lock sensor indicator, if necessary.



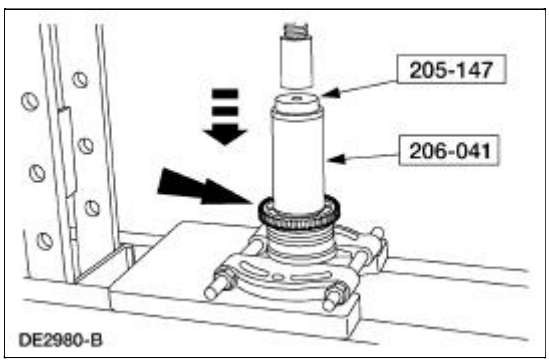
Assembly

1. Using the special tool and a hammer, install the new dust seal assembly, if removed.



2. **CAUTION: Place only the inboard CV joint outer race land on the bearing plate. Do not press against any other portion of the outer race or damage will occur.**

   If removed, using the special tools, the bearing plate and a suitable press, seat the rear brake anti-lock sensor indicator against the inboard CV joint housing.



3. Install the halfshaft in the vehicle. For additional information, refer to Halfshaft in this section.